

# Stenomine moths of the Neotropical genus *Timocratica* (Oecophoridae)



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## Synopsis

The genus *Timocratica* Meyrick is revised and a key to the 46 species is provided together with distribution maps, illustrations of the male and female genitalia, and cladistic and phenetic analyses. Biological data and descriptions of the larvae and pupae are given for *T. palpalis* (Zeller) and *T. melanocosta* sp. n. Seventeen new species and one new subspecies are described, and 11 specific synonyms are newly established. Five species previously included in *Timocratica* are provisionally transferred to *Stenoma* Zeller; *S. butyrota* Meyrick (as comb. n.) and *Lychnocrates leucocapna* Meyrick (as comb. rev.) are transferred to *Timocratica*. The genus is restricted to the Neotropical Region and ranges from the gulf area of Mexico to northern Argentina. The species occur mainly in three Life Zones: Tropical Moist Forest, Tropical Premontane Moist Forest, and Tropical Premontane Wet Forest. The larvae of *palpalis* and *melanocosta* are injurious to various species of trees and bore into the trunks, feeding on the bark surrounding the entrance holes.

## Nomenclatural summary

**TIMOCRATICA** Meyrick, 1912

*Lychnocrates* Meyrick, 1926

### **albella-group**

*albella* (Zeller, 1839)

*albitogata* sp. n.

*amseli* Duckworth, 1962 sp. rev.

*albella* Amsel, 1956 (nom. preocc.)

Surinam

Brazil

Venezuela

- anetaea* (Meyrick, 1932)  
*argonais* (Meyrick, 1932)  
     *argonias* Clarke, 1955 (misspelling)  
*bicornuta* sp. n.  
*butyrota* (Meyrick, 1929) **comb. n.**  
     *syndicatis* (Meyrick, 1929) **syn. n.**  
*constrictivalva* sp. n.  
*fuscipalpis* sp. n.  
*grandis* (Perty, [1833])  
*guarani* sp. n.  
*isarga* (Meyrick, 1925)  
*leucorectis* (Meyrick, 1925)  
*macroleuca* (Meyrick, 1932)  
*maturescens* (Meyrick, 1925)  
*megaleuca* (Meyrick, 1912)  
*melanocosta* sp. n.  
*melanostriga* sp. n.  
*nivea* sp. n.  
*palpalis* (Zeller, 1877)  
     *auxoleuca* (Meyrick, 1925)  
     *haywardi* Busck, 1939 **syn. n.**  
*parvifusca* sp. n.  
*parvileuca* sp. n.  
*philomela* (Meyrick, 1925)  
*spinignatha* sp. n.  
*subovalis* (Meyrick, 1932)  
     *stomatocosma* (Meyrick, 1932) **syn. n.**  
*titanoleuca* sp. n.  
*venifurcata* sp. n.  
*xanthosoma xanthosoma* (Dognin, 1913)  
     *sacra* (Meyrick, 1918)  
*xanthosoma leucocephala* **subsp. n.**  
*xanthotarsa* sp. n.  
     species 3  
     species 4  
     species 5  
     species 6  
     species 7  
*leucocapna*-group  
     *effluxa* (Meyrick, 1930)  
     *leucocapna* (Meyrick, 1926) **comb. rev.**  
     species 2  
*monotonia*-group  
     *agramma* sp. n.  
     *fraternella* (Busck, 1910)  
     *longicilia* sp. n.  
     *loxotoma* (Busck, 1909)  
     *major* (Busck, 1911)  
     *meridionalis* sp. n.  
     *monotonia* (Strand, 1911)  
         *isographa* Meyrick, 1912 **syn. n.**  
         *claudescens* Meyrick, 1925 **syn. n.**  
         *crassa* Meyrick, 1925 **syn. n.**  
     *pompeiana* Meyrick, 1925  
     species 1
- Brazil  
 Brazil, Guyana, French Guiana  
  
 Brazil  
 Colombia, Costa Rica, Panama, Peru  
  
 Ecuador  
 Venezuela  
 Brazil, French Guiana, Panama  
 Argentina, Paraguay  
 Bolivia  
 Bolivia, Brazil, French Guiana, Colombia, Peru  
 Bolivia  
 Colombia, French Guiana, Venezuela  
 Colombia  
 Brazil  
 Brazil  
 Brazil  
 Argentina, Bolivia, Brazil  
  
 Costa Rica  
 Brazil  
 Peru  
 Peru  
 Brazil  
  
 Peru  
 Brazil  
 French Guiana  
  
 Colombia, Panama  
 Panama  
 Peru  
 French Guiana  
 Brazil  
 Brazil  
 Colombia  
  
 Bolivia  
 Colombia, Costa Rica, Peru, Venezuela  
 Peru  
  
 Brazil  
 Costa Rica  
 Colombia  
 Costa Rica, Guatemala, Mexico  
 Brazil, Peru  
 Brazil, Paraguay, Bolivia  
 Brazil, Guyana, Colombia, Ecuador  
  
 Peru  
 Costa Rica

## Introduction

The genus *Timocratica* includes the largest known species of Oecophoridae in the world. The females of some species, such as *leucorectis*, have a fore wing length of up to 32 mm, equivalent to about 80 mm wing-span. According to the male and female genitalia, it is a very homogeneous group, but externally the species show great variation, mainly in shape, venation and colour-pattern of the fore wings.

*Timocratica* is confined to the Neotropical Region, ranging from the Gulf of Mexico in the north, to the northern part of Argentina in the south. In South America it is almost restricted to the eastern side of the Andes, with most of the species represented in the Amazonian Basin.

Despite its wide geographical distribution, the genus is confined ecologically to a few Life Zones, chiefly to three: Tropical Moist Forest, Tropical Premontane Moist Forest, and Tropical Premontane Wet Forest (Fig. 1).

During the last 10 years I have reared bark-feeding larvae from several different host-plants in a number of localities, and found the white 'bark-feeder' *Timocratica albella* sensu auctorum to be a species complex. The vexed question of whether these white species and those described in *Lychnocrates* were related to the fuscous species of *Timocratica*, as suggested by Busck, was still unresolved. It was clear that a detailed revision of these groups was needed to solve this question and to provide accurate descriptions and definitions of the bark-feeding species.

The species with dull fuscous fore wings belonging to the *monotonia*- and *leucocapna*-groups are presumably cryptic, while the white species of the *albella*-group are considered to be mimetic. Possible models are the white species of the arctiid genus *Agylla* Walker, which are very abundant and are sympatric with those of *Timocratica*. This hypothesis is supported by field tests in which species of *Agylla* were rejected by birds. As *Timocratica* species are presumably not distasteful to predators, they may form a Batesian mimetic group of *Agylla*.

## Nomenclatural history

The genus *Timocratica* was proposed by Meyrick (1912) to accommodate his fuscous species *isographa*; *tristrigata* Zeller and *major* Busck were included provisionally and later Meyrick (1925) added three new species to the genus. In 1926 he described *Lychnocrates* for another fuscous species, *leucocapna*, and added *effluxa* in 1930.

Although Meyrick described most of the white *Timocratica* species, he never considered them to be congeneric with *isographa* since, according to him, they had veins 2 and 3 ( $CuA_1$  and  $CuA_2$ ) of the fore wings free, not stalked as is usual in the fuscous species. As pointed out by Busck (1938: 283), the venation of the fore wings in this group (*Timocratica* sensu Busck, i.e. *Timocratica* + *Lychnocrates* + the white species) is highly variable, particularly in the white species; it varies not only between but also within species. Some of the white species also have  $CuA_1$  and  $CuA_2$  of the fore wings stalked as in *isographa* and related fuscous species.

Busck (1935) was the first to unite into one genus the fuscous species included here in the *monotonia*-group, the white species and the fuscous *Lychnocrates* species, his decision having been based on the similarity of the male and female genitalia. Clarke (1955) removed *Lychnocrates* from synonymy with *Timocratica*, on account of the free  $CuA_1$  and  $CuA_2$  of the fore wings, but retained *effluxa* (described by Meyrick in *Lychnocrates* and undoubtedly congeneric with *leucocapna*) in *Timocratica*.

Although colour-pattern and wing venation can be used to define three clearly distinct sub-groups, these features are not sufficient to treat them as separate genera. In the Stenominae wing venation seems to have little taxonomic value, and the structure of the male genitalia is the main basis for generic division. As the genitalia of all the species discussed above are so similar, there is little doubt that they constitute a monophyletic group and they are here regarded as a single genus.

## Material and methods

About 500 adult specimens of *Timocratica* were examined, representing 46 species. Of these about 250 are from my collection, 200 are from the BMNH collection, and 50 are from the

NMNH and other institutions indicated in the text. Although my collection contained half of the specimens, these represented only one-third of the species, six of them new. In the BMNH collection four-fifths of the species were represented, including 17 primary types of previously known species and seven of the new species described here. I reared about 100 specimens of two species, *palpalis* and *melanocosta*, and eight larvae and four pupae of these have been studied.

Of the specimens studied, about 300 belonged to only four species: *argonais*, *butyrota*, *melanocosta* and *palpalis*. In contrast, 15 species were represented only by single specimens; nine of these by females, including five of the seven described but unnamed species.

The classification and descriptions of the *Timocratica* species were based on characters of dry adult specimens. Thirty-four characters were selected, as discussed in the section on classification, and used in the cladistic analysis. A selection of these characters was used again in the phenetic analysis as two-state characters.

In the cluster analysis three methods were used to assess the overall similarity or dissimilarity of all species: (a) the product-moment correlation coefficient; (b) the taxonomic distance coefficient (Sneath & Sokal, 1973: 124); (c) Gower's coefficient (Gower, 1971). The data were used either in their untransformed state or after standardization by characters to zero means and unit standard deviations. Clustering of the taxa from the between-taxon similarity/dissimilarity matrix was accomplished by the weighted pair-group method of Sokal & Sneath (1963). All these computations were carried out by a program of Davis (1973), as amended and extended by Dr R. G. Davies (unpublished). The program also constructed and drew on the line-printer, the dendrogram expressing the results of the cluster analysis.

The measurements at the beginning of each description are those of the fore wing length of the smallest and largest specimen, measured in millimetres from the base to the apex of the wing. In several instances the number of available specimens was limited and variation in size of those species may be greater than is indicated by the recorded measurements.

Dissections and slide preparations followed the method described by Robinson (1976). The number of genitalia preparations varied with the relative similarity of species and material available, and is detailed for each species under 'Material examined'. Head preparations were made and illustrated only for representative species of each of the three species-groups. The wing venation is illustrated for representatives of each species-group and for species which differ from the pattern in the group. Drawings of the genitalia are based on individual specimens and are not composite. The size of the illustrations depended on the size of the specimens. Large specimens were drawn to a smaller scale and in some instances figures of different scale appear on the same page. The photographs of the moths show the right-hand wings; where these were unsuitable for photography the left-hand wings were taken and the image reversed. All the drawings and half-tone illustrations except one were made by myself.

The geographical distribution of each species is based on specimen labels, completed and/or corrected, when necessary, according to the 1968 edition of the *Times Atlas of the World*. Localities not traced in this atlas were corrected and completed following Brown (1979). Altitude, when given in feet on the specimen label, was converted into metres, for example: "1000 m (3100 ft)".

The ecological distribution of the species of *Timocratica* is expressed according to Holdridge's system of 'Classification of World Life Zones' (Holdridge, 1967; 1978; Holdridge *et al.*, 1971). This system has the advantages of being simple and easily used by any biologist, not only by ecologists, and of being objective, since it is based mainly upon meteorological data, *viz.*, annual average temperature and total annual precipitation. Another advantage is that most of the Central and South American countries have already been mapped following this system.

Data on temperature and precipitation were taken from Wernsted (1972). However, as there are no meteorological stations at the localities of many of the species, the data used were those provided by the nearest station at the same altitude. In a few cases, no nearby meteorological station at a similar altitude was found in Wernsted, and the nearest station was selected and the temperature corrected assuming a decrease of about 6°C per 1000 m of elevation (Holdridge, 1971: 13). Following these procedures a list of all the localities taken from specimen-labels was organized, including geographic coordinates, altitude, mean annual temperature, total annual



precipitation and the respective Life Zone. This list was submitted to Dr Holdridge who checked it and made corrections and comments.

It must be remembered that label data are sometimes vague or wrong, particularly on specimens from old collections. Therefore, especially in mountainous areas where the climate changes over relatively short distances, many specimens could have been collected in Life Zones different from those calculated from the available label data. Another problem resulting from lack of data and particularly of specimens is that some specimens were probably collected in associations atypical of the Life Zone ('Climatic Association' of Holdridge, 1971: 16). A good example of non-climatic association and of specimens presumably mislabelled is that of *T. major*.

Despite the problems pointed out in the last paragraph, Holdridge's Life Zone system provides valuable information about the ecological adaptations of the species and also gives a good indication of where a species could be expected to occur.

The host-plants collected by the author were identified by Dra M. Brandão Ferreira, Empresa de Pesquisa Agropecuária de Minas Gerais, Belo Horizonte, and are marked in the Table with an asterisk (\*). Other hosts are quoted from Araujo *et al.* (1968: 290) and from Hayward (1969: 72). Brazilian vernacular names for the Myrtaceae are taken from Legrand & Klein (1967-1978). English vernacular names are quoted from Bailey (1900-1902) and Adams (1972). The ichneumonid parasite of *papalis* was identified by Dr M. G. Fitton, BMNH.

### Abbreviations of depositories

BMNH	British Museum (Natural History), London, England
ESALQ	Escola Superior de Agricultura "Luiz de Queiroz", Piracicaba, São Paulo, Brazil
IP	Institut für Pflanzenschutzforschung, Eberswalde, East Germany
LN	Landessammlungen für Naturkunde, Karlsruhe, West Germany
MNHU	Museum für Naturkunde der Humboldt-Universität, Berlin, East Germany
MN	Museu Nacional, Rio de Janeiro, Brazil
NM	Naturhistorisches Museum, Vienna, Austria
NMNH	National Museum of Natural History, Smithsonian Institution, Washington, D.C., U.S.A.
UCV	Universidad Central de Venezuela, Maracay, Venezuela
VB	V. O. Becker collection, Centro de Pesquisa Agropecuária dos Cerrados, Planaltina, Brazil
ZSBS	Zoologische Sammlung des Bayerischen Staates, Munich, West Germany

### Colour-pattern and defence

Species of *Timocratica* show two basic colour-patterns. Those belonging to the *monotonia* and *leucocapna* species-groups, as well as *parvifusca*, which belongs to the *albella*-group, have dull fuscous fore wings and bright golden-ochreous hind wings and abdomen. The species of the *albella*-group, except for *parvifusca*, have white fore wings and white or golden-yellow hind wings and abdomen.

Concerning protection against predation, the first group is probably cryptic, or possibly cryptic only when at rest as the raised golden-ochreous hind wings are possibly aposematic. The second group, the whites, are probably mimetic. Adults of many species of arctiids are known to be toxic (Rothschild *et al.*, 1979), and field tests carried out by Collins & Watson (1981) in Venezuela showed that white species of lithosiids (Arctiidae) were rejected by birds. These mostly white lithosiids form a very large and common group, now included in the genus *Agylla*, and are sympatric with the species of *Timocratica*. If the species of *Timocratica* prove not to be toxic, they would form a Batesian mimetic group of the species of *Agylla*.

This complex of white mimics may also include other moths, such as species of *Rupela* Walker (Schoenobiinae), a large genus of Neotropical pyralids.

The cryptic group of *Timocratica* includes 12 species, the supposed mimic group 34 species. Thus, if other factors that might affect the success of a group of living organisms are excluded, it seems that a mimetic habitus provides more effective protection than crypsis in *Timocratica*.

## Geographical and ecological distribution

The *monotonia*-group, despite its relatively small number of species, has the widest geographical and ecological distribution. It ranges from Mexico and Central America, where it is represented by two species, possibly three, to the Warm Temperate Moist Forest in the southern part of Brazil, where it is represented by *meridionalis*; one species, *longicilia*, occurs in the Tropical Montane Rain Forest in the mountains of Colombia.

The *leucocapna*-group appears to be a montane group as it has been collected only in the mountains of Peru, Colombia and Costa Rica, being restricted to the Tropical Premontane Moist Forest and the Tropical Premontane Wet Forest Life Zones.

The *albella*-group, the largest of the species-groups, is mainly South American and only two species, *xanthotarsa* and *parvifusca*, are known to occur in Central America (Panama and Costa Rica). Ecologically the group is almost confined to the Tropical Moist Forest and the Tropical Premontane Moist Forest and Wet Forest, but it is represented by three species in the Warm Temperate and Subtropical Moist Forest, and by one, *guarani*, in the Warm Temperate Dry Forest.

## Classification of *Timocratica*

Like many other lepidopterous groups of the Neotropical Region, particularly Microlepidoptera, the Stenomininae have been very little studied or even collected. Therefore it is very difficult to appreciate the degree of variation in the group, or the relationship between the different groups in the subfamily.

An attempt was made to work out the phyletic relationship of the species based on a cladistic analysis of the genus. However, as discussed below, many difficulties were found and only a basic division of the genus into three species-groups, as arranged in the cladogram (Fig. 2), seems to be sound; because of this, the species of each of the three species-groups are arranged phenetically, following numerical methods.

### Cladistic analysis

Although the species now included in the genus *Timocratica* show great external differences between species-groups, mainly in colour-pattern, they apparently constitute a monophyletic group. According to the characters discussed below, the genus is composed of three species-groups, each of them also apparently monophyletic.

This basic division of the genus into three species-groups seems consistent and presumably reflects very well the first steps of its evolution. However, above this level it was impossible to understand the relationship between the species within each of the three groups. The main difficulty is lack of data. Obviously many of the apomorphies are not expressed morphologically, but reflected in behaviour, host-preferences, ecological adaptations, and other biological and physiological features. As the biology of *Timocratica* is insufficiently known, none of this information can be included in the analysis. Another difficulty is related to the method itself, as conceived by Hennig (1966). It seems that cladistic analysis may work very well at generic level and for higher classification, but not at specific level, except perhaps with relatively small and well-known groups. At the specific level it is often very difficult to decide whether a particular state of a character is primitive (plesiomorphic) or derived (apomorphic).

Although most of the important genera of the subfamily are still poorly known, it seems very likely that the sister-group of *Timocratica* is the genus *Loxotoma* Zeller, which includes only two described species. They have similarly broad valvae, with sacculus and ampulla not differentiated, and a strong uncus that is basally broad and bent ventrad. *Loxotoma* also constitutes a monophyletic group, whose species share at least the apomorphic state of character 1. The monophyly of *Timocratica* is defined by characters 2–4 (Fig. 3). In the following list the headings denote the apomorphic state.

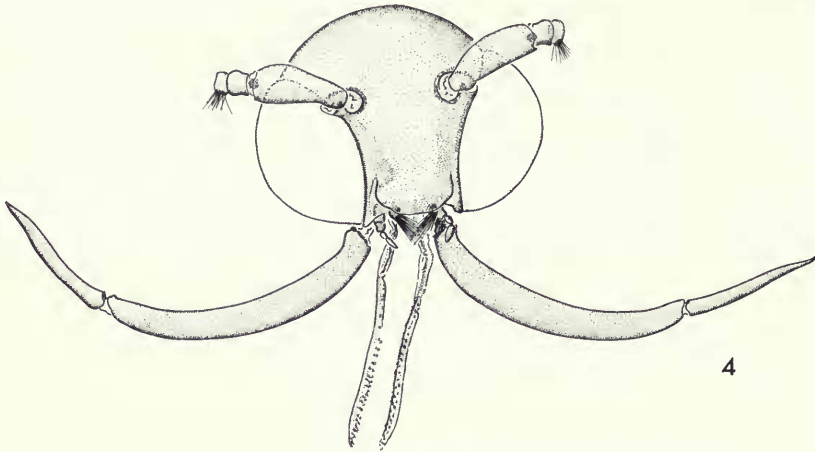




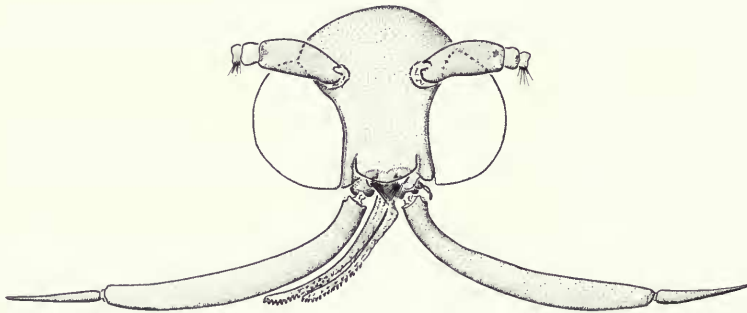


## (9) Fore wings with cubital veins stalked

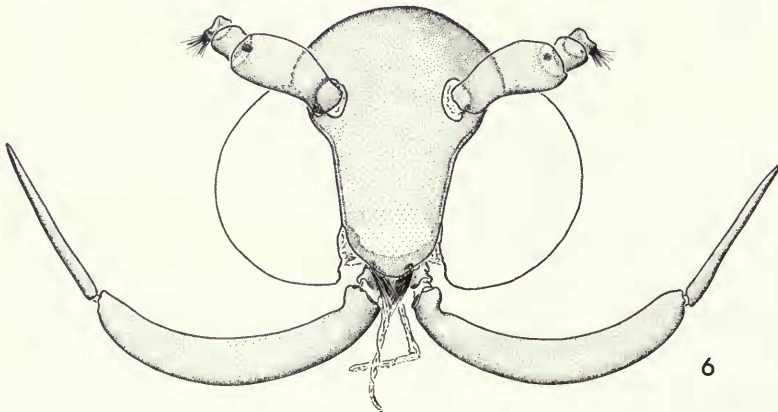
The species of the *monotonia*-group have the fore wings with  $CuA_1$  and  $CuA_2$  stalked (Fig. 12); in the *leucocapna*-group all the veins are free (Fig. 13); and in the *albella*-group the veins are free in most species but in some the cubitals are stalked (Figs 13, 16, 24). However, the stalking in these few species seems to be linked to the stalking of veins  $R_4$  and  $R_5$ , a character not found in the other two species-groups. Considering that *Loxotoma* also has all the veins free, the stalking of the cubital veins in the *monotonia*-group can be considered apomorphic.



4

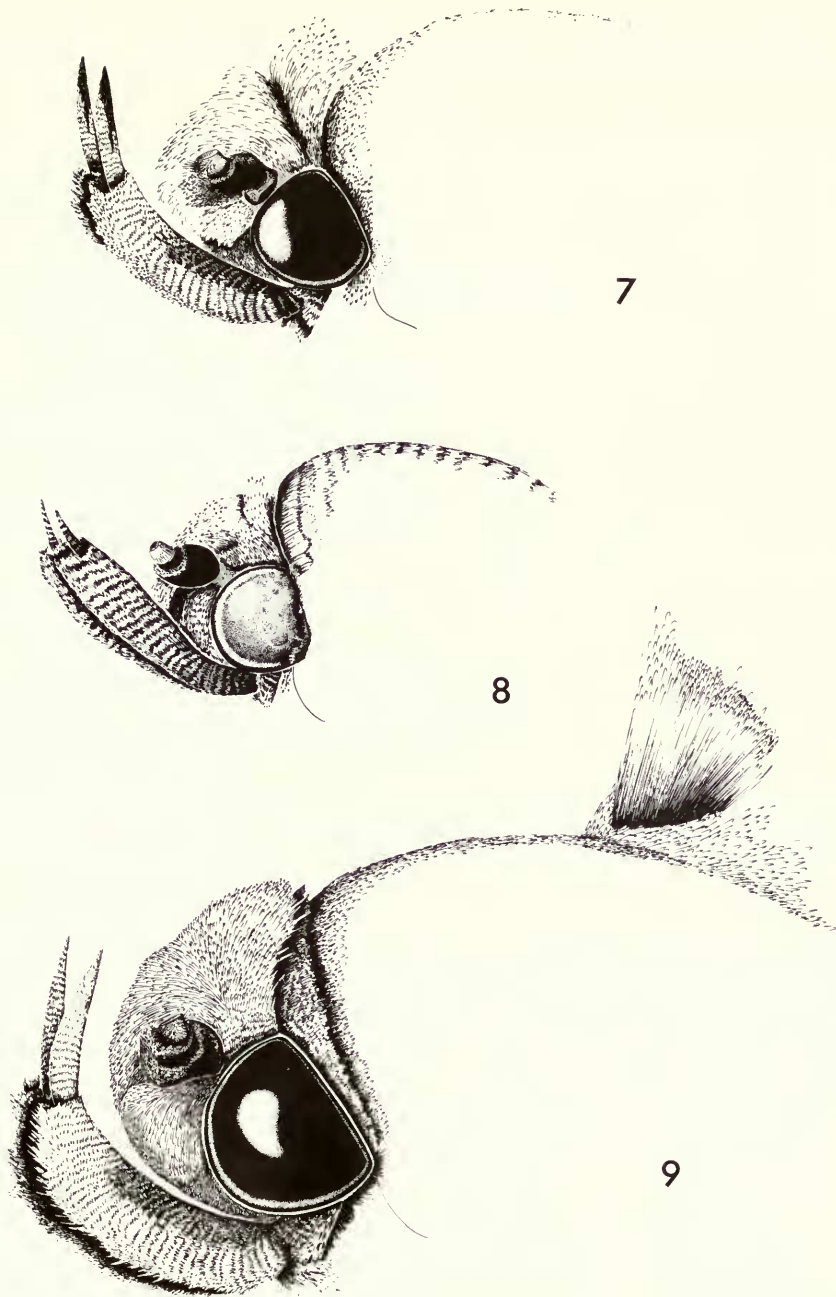


5



6

Figs 4–6 *Timocratica* species, frontal view of denuded heads. 4, *T. palpalis* (Zeller). 5, *T. leucocapna* (Meyrick). 6, *T. monotonia* (Strand).



Figs 7–9 *Timocratica* species, lateral view of heads with dorsal outline of thorax. 7, *T. palpalis* (Zeller). 8, *T. leucocapna* (Meyrick). 9, *T. monotonia* (Strand).

#### Phenetic analysis

A satisfactory arrangement based on a cladistic analysis of the species-groups, mainly those within the *albella*-group, could not be produced. This failure was due mainly to the mosaic pattern of evolution shown by the species. An assessment of phenetic similarity was therefore made, following numerical methods, as shown in Figs 10, 11.

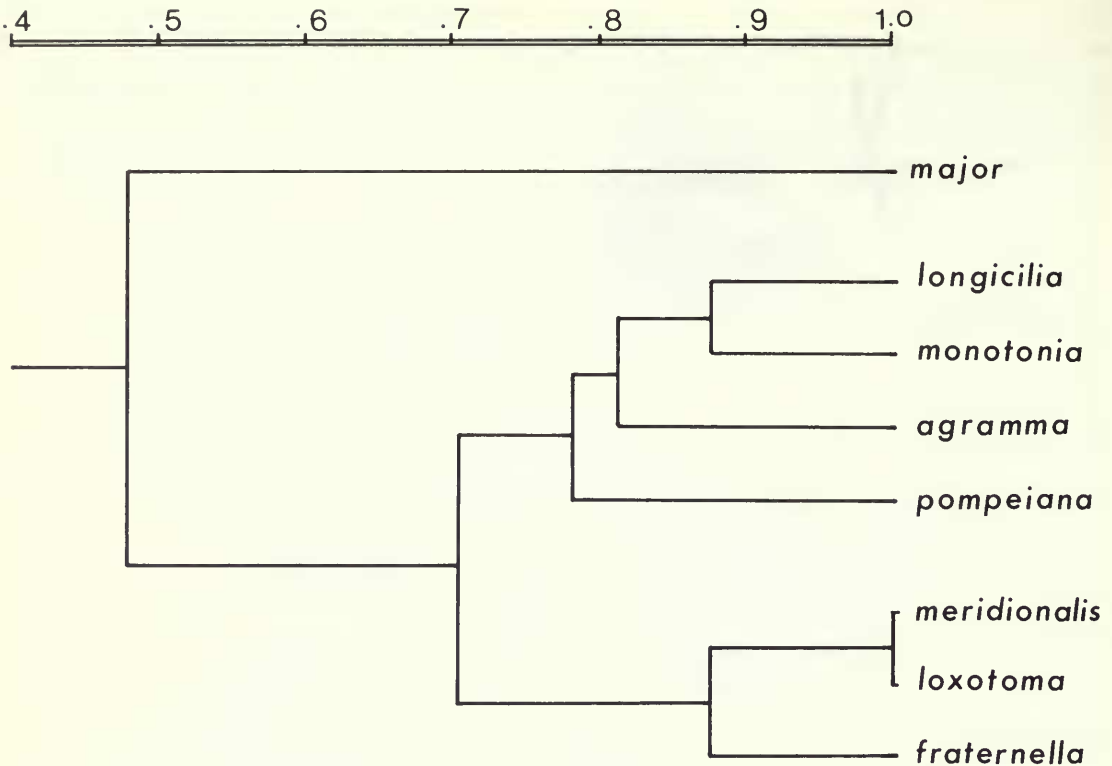


Fig. 10 Phenogram of the species of the *monotonia*-group of *Timocratica* calculated by weighted pair-group method of average linkage from matrix of between OTU Gower's coefficient. Numbers at top denote magnitude of correlation coefficient.

In addition to the nine characters used in the cladistic analysis a further twenty-five were selected and used in the phenetic analysis (Table 1).

The arrangements given by the three phenetic methods showed few differences from one another, and in a few cases they were even identical. However, the most generally satisfactory results were provided by Gower's Coefficient.

The clustering of the *monotonia*-group (Fig. 10) was based on characters 6 and 10 to 16. The basic division of this group into three subgroups, as shown in the phenogram, reflects very well what was expected from the overall similarity of the species. *T. major* is really a very distinctive species in the group, and its separation from the others seems plausible. The division of the other species into two groups, as shown in the same phenogram, also seems correct, although the arrangement of the species inside each of these subgroups does not reflect very well what might have been expected from their overall resemblance. As discussed in the taxonomic section, *monotonia* and *pompeiana* would have been expected to form a pair of very closely related species, or even to appear as forms of the same species. In the other subgroup, for the same reasons, *fraternella* and *loxotoma* should form a pair of closely related species, as indicated by the absence of coremata on the male abdomens and by their geographic distribution. The species *meridionalis* and *loxotoma* came together in the phenogram because the free coremata (character 12), as present in *meridionalis*, and the absence of coremata, as shown in *loxotoma* and *fraternella*, were both considered as apomorphic, while the presence of coremata bound into pockets, as shown by the other species of the group, is considered plesiomorphic. As *meridionalis* and *loxotoma* are almost identical in respect of the remaining characters, they were therefore clustered together, while *fraternella*, which shares the absence of coremata with *loxotoma*, was separated from both by the apomorphic fuscous hind wings.

**Table 1** Characters used in the phenetic analysis as two-state variables. a = presumed apomorphies, p = presumed plesiomorphies, ? = assessment of apomorphy/plesiomorphy not established.

Character no.	Description
10	a. Fore wing with apex pointed p. Fore wing with apex rounded
11	a. Fore wing with fasciae linked posteriorly p. Fore wing with fasciae free
12	a. Coremata of second abdominal segment free or absent p. Coremata of second abdominal segment located in a pocket
13	a. Hind wing fuscous p. Hind wing golden-ochreous or golden-yellow
14	a. Apex of gnathos folded p. Apex of gnathos not folded
15	a. Fore wing with transverse fasciae absent p. Fore wing with transverse fasciae present
16	a. Valva with base broader than distal part p. Valva with dorsal and ventral margins almost parallel or narrowed basally
17	a. Hind wing bordered with fuscous p. Hind wing plain golden-yellow
18	a. Hind wing white or tinged with yellow p. Hind wing plain golden-yellow
19	a. Abdomen above white or tinged with yellow p. Abdomen above plain golden-ochreous
20	a. Fore wing underside with yellow colour absent p. Fore wing underside with yellow colour present
21	a. Hind tarsus white p. Hind tarsus golden-ochreous
22	a. Fore tarsus white p. Fore tarsus fuscous
23	a. Fore tarsus golden-ochreous p. Fore tarsus fuscous
24	a. Frons plain white p. Frons edged with fuscous
25	a. Labial palpus with ochreous colour absent p. Labial palpus with ochreous colour present
26	a. Labial palpus with fuscous colour absent p. Labial palpus with fuscous colour present
27	a. Gnathos with lateral arms modified p. Gnathos with lateral arms not modified
28	a. Vesica with small spines missing p. Vesica with small spines present
29	a. Fore wing with $R_4$ and $R_5$ stalked p. Fore wing with $R_4$ and $R_5$ free
30	a. Fore wing with base of costa tinged with grey p. Fore wing with base of costa white
31	a. Veins marked with dark fuscous p. Veins not marked with dark fuscous
32	a. Ductus bursae and corpus bursae not differentiated p. Ductus bursae and corpus bursae differentiated
33	? Gnathos with pointed apex ? Gnathos with rounded apex
34	? Margin of ostium bursae convex ? Margin of ostium bursae concave or straight

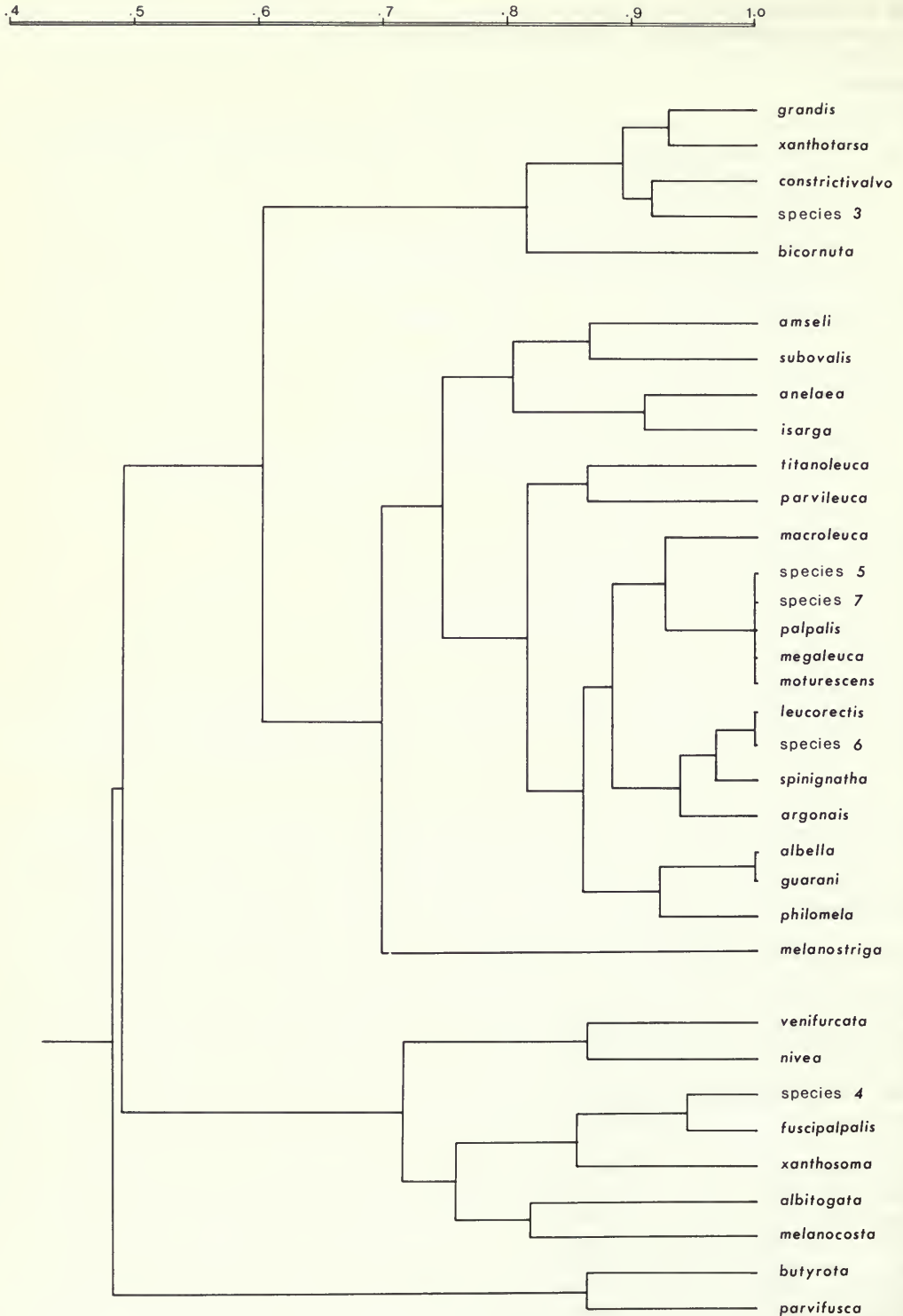


Fig. 11 Phenogram of the species of the *albella*-group of *Timocratica* calculated by weighted pair-group method of average linkage from matrix of between OTU Gower's coefficient. Numbers at top denote magnitude of correlation coefficient.

The arrangement of the species of the *albella*-group was based on the similarity of characters 5, 9 and 19–34. The resulting grouping (Fig. 11) also looks reasonable, except that the species with a golden-ochreous abdomen and white hind wings, related to *xanthosoma*, were mixed up with those related to *albella* which have a white abdomen and white hind wings. If this character (the colour of the abdomen in the *albella*-group) is considered as more important than most of the others analysed, then *amseli*, *subovalis*, *venifurcata*, *xanthosoma* and *fuscipalpalis* should form a group of closely related species. A few other species, viz., *anelaea* + *isarga* and *titanoleuca* + *parvileuca*, also seem to be wrongly associated. As discussed in the taxonomic section, *isarga* appears to be related to *palpalis*, and *parvileuca* to *butyrota*. These apparent inaccuracies in the phenetic cluster analysis probably resulted from the lack of representation of males or females in about two-thirds of the species, and from the equal weight given to all characters.

### *TIMOCRATICA* Meyrick

*Timocratica* Meyrick, 1912; 706; Busck, 1935: 16 [catalogue]; Clarke, 1955: 384 [adult, genitalia]. Type-species: *Timocratica isographa* Meyrick, 1912 [= *Cryptolechia monotonia* Strand, 1911], by original designation and monotypy.

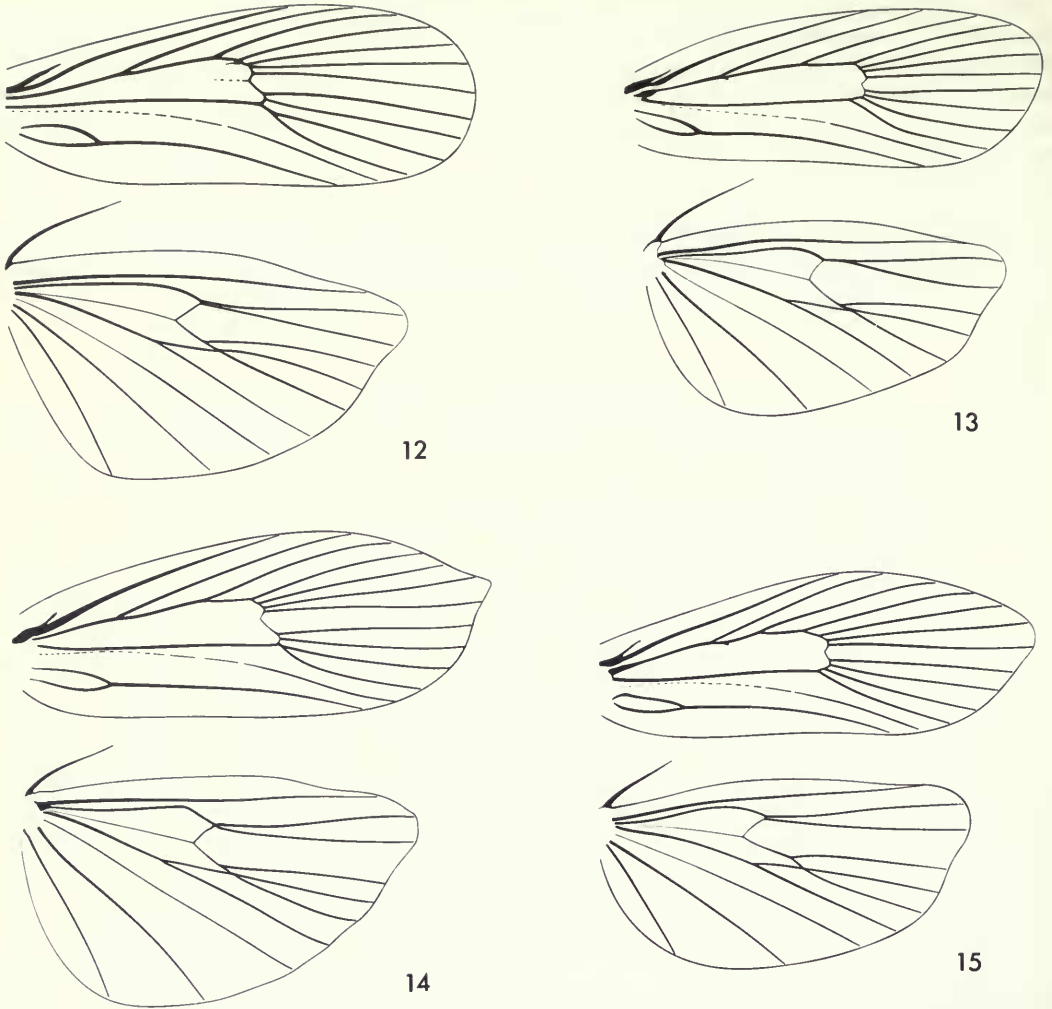
*Lychnocrates* Meyrick, 1926: 226; Clarke, 1955: 224 [adult, genitalia]. Type-species: *Lychnocrates leucocapna* Meyrick, 1926, by monotypy. [Synonymized by Busck, 1935: 16.]

Vertex densely covered with long, narrow scales. Haustellum slightly shorter than second segment of labial palpus, covered basally with long scales, distal half with sensory papillae. Maxillary palpus four-segmented, about length of first segment of labial palpus. Labial palpus ascending, reaching to vertex or beyond; first segment very short, one-quarter length of second; second segment about twice length eye diameter, slightly curved upwards, with long rough scales below; third segment one-third to same size as second, smooth-scaled, thick to slender, slightly curved upwards, or straight. Antenna three-quarters length of fore wing, ciliation one-half to twice diameter of flagellum. Thorax with or without dorsal crest, densely or sparsely covered with long hair-like scales below. Metascutum with pair of long, hair-like, posteriorly directed groups of scales. Fore tarsus thickened by long scales; hind tibia covered with long, rough, hair-like scales. Fore wing subrectangular to suboval; apex rounded, pointed in few species; fuscous, often with three oblique fasciae, or plain white; 12 veins (11 in holotype of *syndicastis* [= *butyrota*]),  $R_1$  from middle of cell,  $R_2$  closer to  $R_3$  than to  $R_1$ ,  $R_4$  and  $R_5$  very close, connate or stalked;  $CuA_1$  and  $CuA_2$  very close, connate or stalked (Figs 12–24). Hind wing sometimes golden-ochreous to plain white, rarely fuscous. Abdomen long, robust, weakly sclerotized, reaching tornus in resting position, densely covered with narrow scales; male often with pair of coremata on second sternite (Fig. 25); apodemes on second abdominal sternite short in female, modified in male to accommodate coremata; sternites two to seven with some small sparsely distributed setae; eight with several longer ones; first tergite as well as genitalia covered with long narrow scales; female with dorsal membrane between eighth and ninth segments expanded as a wide inwardly directed sac.

**GENITALIA ♂.** Symmetrical. Uncus very broad basally, nearly triangular or with lateral margins nearly parallel, long, strong, bent ventrad, naked. Gnathos often belt-like, modified medially into strong, sclerotized, often pointed process. Juxta a transverse plate with two long, usually symmetrical, posteriorly directed lobes covered distally with long setae. Vinculum complete, often rounded. Valva long, broad, lateral margins nearly parallel or constricted basally, inner surface of distal half covered with many modified, strong, apically divided setae; ampulla and sacculus slightly or not differentiated, covered with very long setae. Aedeagus cylindrical, straight or bent ventrad; inception of bulbus ejaculatorius basal, often on dorsal side of aedeagus; vesica often with one strong cornutus and many smaller, acutely pointed spines.

**GENITALIA ♀.** Papillae anales slightly to strongly sclerotized, sparsely covered with very long setae. Eighth segment strongly sclerotized, tergite with irregular row of long setae on posterior margin, sternite covered with very long setae. Apophyses anteriores and posteriores of same length or latter slightly longer. Ostium bursae narrow to broad; antrum cylindrical or conical; ductus bursae straight or bent posteriorly; corpus bursae nearly globular; signa present as plates with inwardly directed spines; inception of ductus seminalis near ostium; walls of ductus and corpus bursae often scobinate.

**REMARKS.** In the right fore wing of the holotype of *isographa*, veins  $R_4$  and  $R_5$  have a short common stalk while the left shows the normal condition with  $R_4$  and  $R_5$  separate. This was noted by Meyrick in the original description; however, Clarke (1955: pl. 192, fig. 1a) illustrated the anomalous wing which is not representative of the venation of the *monotonia*-group.



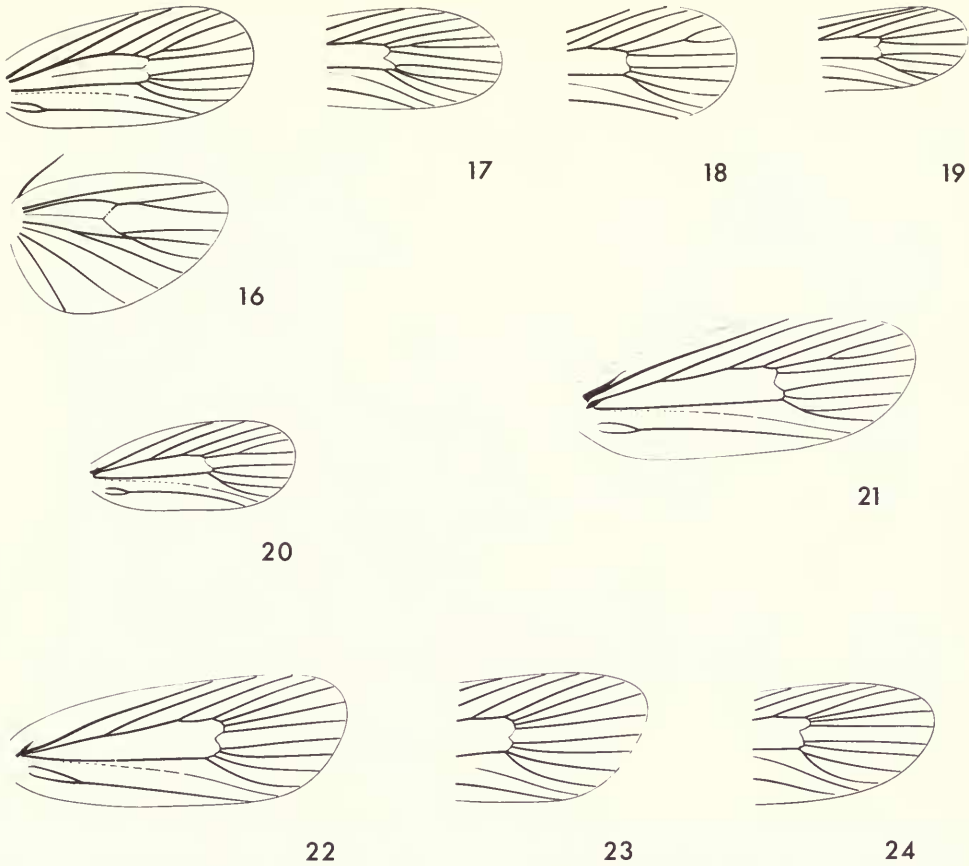
**Figs 12–15** Wing venation of *Timocratica* ♂. 12, *T. monotonia* (Strand). 13, *T. palpalis* (Zeller). 14, *T. major* (Busck). 15, *T. leucocapna* (Meyrick).

The non-white *Timocratica* species show some external resemblance to *Thioscelis* Meyrick and *Loxotoma* and probably form the sister-group of the latter. They can easily be distinguished from these genera as *Thioscelis* has unusually long hind legs and *Loxotoma* has conspicuous shades of pink on the hind wings. These two genera also have coremata in pockets on the second abdominal sternite, and the entire valva has strong, apically bifurcated setae. However, in *Loxotoma* the gnathos is divided in the middle and each of the digitate processes of the juxta are split into two branches. *Thioscelis* has an entire gnathos but the valva has a well-developed ampulla, a character absent in *Timocratica*.

**PUPA.** Pupae of only *palpalis* and *melanocosta* were available for this study, and these show generalized gelechioid characters. However, like other Stenominae, they are slightly flattened dorso-ventrally and have the abdomen sharply curved ventrad, with the fifth, sixth and seventh segments free. They also have strong dorsal incisions on these three segments, allowing dorso-ventral movements only.

Two specializations are not shared by the other known pupae: the two long cremaster processes, called 'anal legs' by Powell (1973: 26), and the peculiar projection of the pronotum





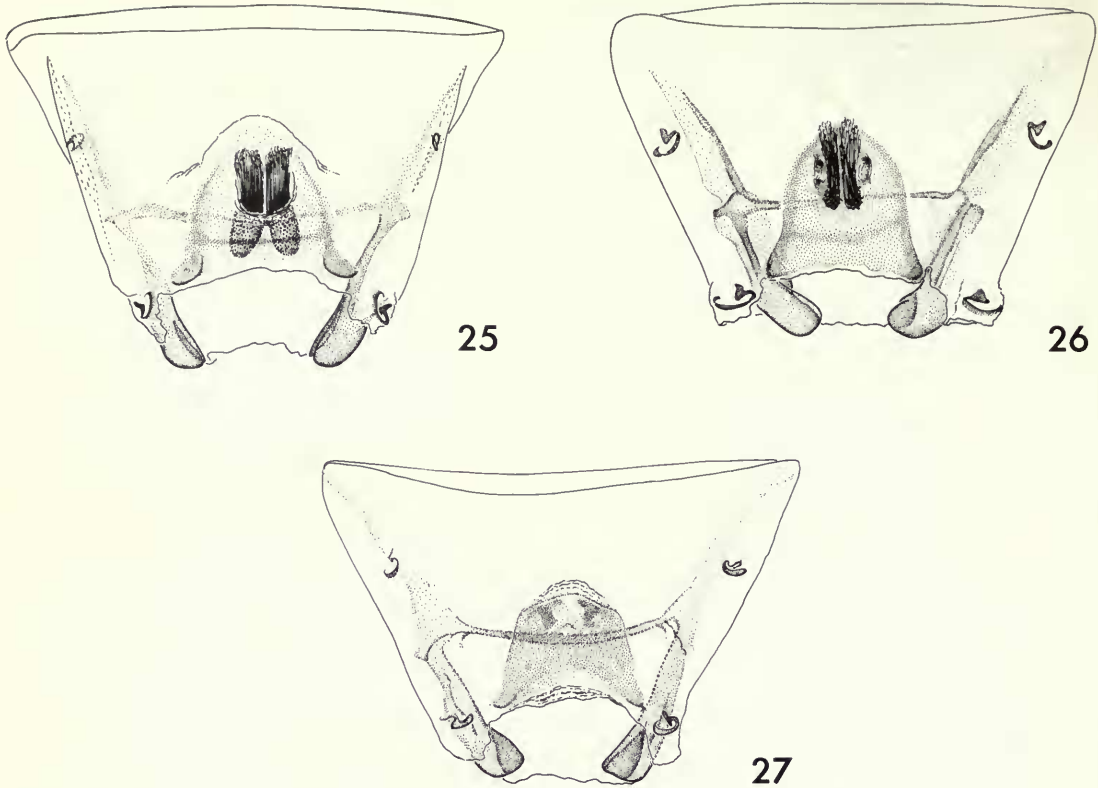
**Figs 16–24** Wing venation of *Timocratica* ♂. 16–19, *T. butyrota* (Meyrick). 20, *T. parvifusca* sp. n. 21, *T. venifurcata* sp. n. 22–24, *T. nivea* sp. n.

(Figs 46–48). The ‘anal legs’, which anchor the pupa to the gallery walls, are also known in other gelechioid groups, such as *Ethmia* Hübner (Ethmiidae) (Powell, 1973: 26) and *Agonoxena* Meyrick (Agonoxenidae) (Bradley, 1966: 468), and it seems likely that they might occur in other Stenominae. For the time being, the expansion of the pronotum can be used to distinguish *palpalis* and *melanocosta* from the other known stenomine pupae.

**LARVA.** Larvae of only *palpalis* and *melanocosta* were available for this study, both species belonging to the *albella*-group. As this does not include *monotonia*, the type-species of the genus, it is not certain that the characters in these two species are representative of the whole genus.

Apart from these, the larvae (and pupae) of only five other stenomine species have been described: *Antaeotricha dissimilis* (Kearfott) (Becker, 1970), *A. schlaegeri* (Zeller) (Mackay, 1972), *Stenoma crambina* Busck (Dampf, 1929), *S. decora* (Zeller) (Silva & Heinrich, 1946) and *S. ybyrajuba* Becker (Becker, 1971). The available information is therefore inadequate for generalizations to be made about the taxonomic value of characters, and the relationship of the Stenominae with other gelechioid groups, although some characters are very similar in the larvae of all seven species.

Like other gelechioids, stenomine larvae have three prespiracular setae, L1, L2, L3, on the prothorax, and L1 and L2 on the same pinaculum on abdominal segments 1–8. In *Timocratica* and the five species mentioned above, the adfrontal area of the head does not extend to the vertical angle and the distance between setae P2 is the same as or less than the distance between setae P1 (Fig. 39). These characters are also found in the Xyloryctinae, whereas in all other



Figs 25–27 *Timocratica* species, abdominal segments 1–2. 25, *T. monotonia* (Strand). 26, *T. meridionalis* sp. n. 27, *T. loxotoma* (Busck).

gelechioids the distance between setae P2 is greater than that of setae P1, and the adfrontal area reaches the vertical angle of the head, except in some Ethmiidae. According to Powell (1973) the adfrontal area in *Ethmia* often reaches the vertical angle, but in a few species it does not. However, as in other gelechioids, except for Stenominae and Xyloryctinae, the distance between setae P2 is always greater than the distance between setae P1.

In an attempt to trace relationships among the gelechioids I examined the larvae of four Australian Xyloryctinae in the BMNH: *Cryptophasa hyalinopa* Lower, *C. balteata* Meyrick, *Echiomima mythica* Meyrick and *Perixestis eucephala* (Turner). These species also have the adfrontal area not reaching the vertical angle of the head and the distance between setae P2 is almost the same as that between setae P1. Therefore it seems that the combination of both characters of the head, i.e., adfrontal area not reaching the vertical angle and the distance between setae P2 about the same as between setae P1, is a good diagnostic feature for distinguishing the larvae of Stenominae and Xyloryctinae from those of other Gelechioidea.

The larvae of the two species of *Timocratica* described here can be distinguished easily from the other five, as the former have setae D and setae SD on the same pinaculum on both the meso- and metathorax, and a series of extra sclerotized areas, 'pinacula without setae', on the meso- and metathorax and on segments 1–7 of the abdomen.

#### Key to species and subspecies

*Note.* The males of *albella*, *isarga*, *megaleuca*, *melanostriga*, species 1, and species 3 to species 7, and the females of *anelaea*, *constrictivalva*, *fuscipalpalis*, *guarani*, *macroleuca*, *maturescens*, *parvifusca*, *parvileuca*, *philomela*, *spinignatha*, *subovalis*, *titanoleuca*, *venifurcata*, *xanthotarsa*, *effluxa*, *agramma*, *fraternella*, *longicilia*, *pompeiana* and species 2 are unknown.

1	Ground-colour of fore wing white ( <i>albella</i> -group)	14
-	Ground colour of fore wing not white . . . . .	2
2 (1)	Fore wing with all veins free ( <i>leucocapna</i> -group)	4
-	Fore wing with not all veins free . . . . .	3
3 (2)	Fore wing with $R_4$ and $R_5$ free ( <i>monotonia</i> -group)	6
-	Fore wing with $R_4$ and $R_5$ stalked	<i>parvifusca</i> (p. 270)
4 (2)	Hind wing edged with fuscous . . . . .	<i>effluxa</i> (p. 240)
-	Hind wing not edged with fuscous . . . . .	5
5 (4)	Fore wing of male less than 23 mm . . . . .	<i>leucocapna</i> (p. 238)
-	Fore wing of male more than 25 mm . . . . .	species 2 (p. 239)
6 (3)	Apex of fore wing pointed . . . . .	<i>major</i> (p. 231)
-	Apex of fore wing rounded . . . . .	7
7 (6)	Hind wing golden-ochreous . . . . .	9
-	Hind wing yellowish fuscous or dark fuscous . . . . .	8
8 (7)	Abdomen golden-ochreous . . . . .	species 1 (p. 237)
-	Abdomen golden-ochreous crossed with fuscous bands . . . . .	<i>fraternella</i> (p. 237)
9 (7)	Fore wing without distinctive fasciae . . . . .	<i>agramma</i> (p. 232)
-	Fore wing with three distinctive fasciae . . . . .	10
10 (9)	Antenna with ciliation clearly longer than diameter of flagellum . . . . .	<i>longicilia</i> (p. 232)
-	Antenna with ciliation about diameter of flagellum . . . . .	11
11 (10)	Second abdominal sternite without coremata . . . . .	<i>loxotoma</i> (p. 236)
-	Second abdominal sternite with coremata . . . . .	12
12 (11)	Coremata on second abdominal sternite in inverted pockets . . . . .	13
-	Coremata on second abdominal sternite free, attached to the sternite surface	<i>meridionalis</i> (p. 235)
13 (12)	Male genitalia with margins of valva nearly parallel . . . . .	<i>monotonia</i> (p. 234)
-	Male genitalia with margins of valva not parallel, converging towards apex	<i>pompeiana</i> (p. 233)
14 (1)	Fore wing plain white . . . . .	15
-	Fore wing marked with dark fuscous . . . . .	<i>melanostriga</i> (p. 266)
15 (14)	Hind wing plain golden-yellow . . . . .	16
-	Hind wing white or tinged with yellow . . . . .	20
16 (15)	Fore tarsus fuscous . . . . .	19
-	Fore tarsus golden-ochreous . . . . .	17
17 (16)	Fore wing with veins $CuA_1$ and $CuA_2$ stalked . . . . .	species 3 (p. 243)
-	Fore wing with veins $CuA_1$ and $CuA_2$ not stalked . . . . .	18
18 (17)	Gnathos basally with long, digitate processes . . . . .	<i>constrictivalva</i> (p. 243)
-	Gnathos basally without long, digitate processes . . . . .	<i>xanthotarsa</i> (p. 242)
19 (16)	Mid tarsus fuscous above . . . . .	<i>grandis</i> (p. 240)
-	Mid tarsus golden-ochreous . . . . .	<i>bicornuta</i> (p. 241)
20 (15)	Abdomen plain golden-ochreous above . . . . .	21
-	Abdomen white, or tinged with yellow, or crossed with white bands above . . . . .	27
21 (20)	Hind wing plain white . . . . .	22
-	Hind wing tinged with yellow . . . . .	species 4 (p. 244)
22 (21)	Fore wing with $R_4$ and $R_5$ stalked . . . . .	<i>venifurcata</i> (p. 245)
-	Fore wing with $R_4$ and $R_5$ not stalked . . . . .	23
23 (22)	Fore wing with base of costa fuscous . . . . .	24
-	Fore wing with base of costa not fuscous . . . . .	25
24 (23)	Head with vertex golden-yellow . . . . .	<i>xanthosoma xanthosoma</i> (p. 247)
-	Head with vertex white . . . . .	<i>xanthosoma leucocephala</i> (p. 247)
25 (23)	Second segment of labial palpus almost fuscous externally . . . . .	<i>fuscipalpalis</i> (p. 246)
-	Second segment of labial palpus almost ochreous externally . . . . .	26
26 (25)	Vesica with strong cornutus and many smaller spines . . . . .	<i>subovalis</i> (p. 243)
-	Vesica with strong cornutus only . . . . .	<i>amseli</i> (p. 244)
27 (20)	Abdomen golden-ochreous crossed with white bands above . . . . .	<i>anelaea</i> (p. 248)
-	Abdomen white or tinged with yellow above . . . . .	28
28 (27)	Hind tarsus plain white . . . . .	29
-	Hind tarsus golden-yellow, or tinged with yellow . . . . .	33
29 (28)	Fore tarsus white or mixed with white scales above . . . . .	30
-	Fore tarsus fuscous above . . . . .	<i>isarga</i> (p. 266)
30 (29)	Abdomen tinged with yellow above . . . . .	31
-	Abdomen plain white above . . . . .	32

31 (30)	Frons white edged with fuscous . . . . .	<i>guarani</i> (p. 268)
—	Frons plain white . . . . .	<i>albella</i> (p. 267)
32 (30)	Fore wing with costa dark grey basally . . . . .	<i>melanocosta</i> (p. 261)
—	Fore wing with costa white basally . . . . .	<i>nivea</i> (p. 262)
33 (28)	Fore tarsus white above . . . . .	34
—	Fore tarsus dark fuscous above . . . . .	36
34 (33)	Abdomen and underside of wings plain white . . . . .	<i>albitogata</i> (p. 264)
—	Abdomen and underside of wings tinged with yellow . . . . .	35
35 (34)	Second segment of labial palpus golden-yellow below . . . . .	<i>macroleuca</i> (p. 248)
—	Second segment of labial palpus dark fuscous below . . . . .	<i>titanoleuca</i> (p. 248)
36 (33)	Hind wing tinged with yellow above . . . . .	37
—	Hind wing white above . . . . .	41
37 (36)	Second segment of labial palpus golden-yellow below . . . . .	39
—	Second segment of labial palpus dark fuscous below . . . . .	38
38 (37)	Fore wing with $R_4$ and $R_5$ stalked . . . . .	<i>butyrota</i> (p. 269)
—	Fore wing with all veins free . . . . .	<i>parvileuca</i> (p. 269)
39 (37)	Abdomen white above . . . . .	40
—	Abdomen tinged with yellow above . . . . .	<i>spinignatha</i> (p. 250)
40 (39)	Fore wing more than 20 mm . . . . .	species 6 (p. 265)
—	Fore wing less than 15 mm . . . . .	<i>philomela</i> (p. 268)
41 (36)	Second segment of labial palpus white internally . . . . .	42
—	Second segment of labial palpus almost golden-ochreous . . . . .	<i>maturescens</i> (p. 252)
42 (41)	Fore femur dark fuscous above . . . . .	43
—	Fore femur yellow above . . . . .	44
43 (42)	Fore wing white below along apex and termen . . . . .	<i>palpalis</i> (p. 253), <i>megaleuca</i> (p. 253)
—	Fore wing dark fuscous below along apex and termen . . . . .	<i>argonais</i> (p. 251)
44 (42)	Mid femur yellow above . . . . .	species 7 (p. 265)
—	Mid femur white above . . . . .	45
45 (44)	Fore wing more than 25 mm . . . . .	<i>leucorectis</i> (p. 249)
—	Fore wing less than 20 mm . . . . .	species 5 (p. 250)

### Division of *Timocratica* into species-groups

Except for *parvifusca*, a small species of uncertain position, all species can easily be clustered into three well-defined natural groups: 1) the *albella*-group which includes species with white fore wings (Figs 68–78); 2) the *monotonia*-group whose species have fuscous fore wings with three oblique, nearly parallel fasciae (Figs 55–63); 3) the *leucocapna*-group which includes species with dark fuscous fore wings, without fasciae, but with a diffuse white area beyond the cell and an area of yellow scales on the basal half of the costa (Figs 64–66). *T. parvifusca* (Fig. 67) is a small, dark fuscous species in which the fore wing has  $R_4$  and  $R_5$  and  $CuA_1$  and  $CuA_2$  stalked. The wing-shape, genitalia, wing-venation, and distribution put it very close to *butyrota*, a small white species in the *albella*-group. The fuscous colour of *parvifusca* is presumably due to a secondary loss of the advanced state.

These three species-groups are defined by characters 5–9 (Figs 2, 3), discussed as follows. Character 5 is the apomorphy of the clade comprising the *albella*-group + *leucocapna*-group, 6 is the apomorphy of the *albella*-group, 7 of the *leucocapna*-group, and 8–9 the apomorphies which define the *monotonia*-group (see cladogram, Fig. 2).

### The *monotonia*-group

♂, ♀, 14–30 mm. Head, thorax above, and fore wing fuscous. Third segment of labial palpus about two-thirds as long as second, ascending vertex very close to head. Thorax with crest of long, narrow scales (Fig. 9). Fore wing with apex rounded, acute in *major*;  $CuA_1$  and  $CuA_2$  stalked at basal quarter; three oblique, nearly parallel fasciae crossing wing, except in *agramma*. Hind wing often pale to golden-ochreous, fuscous in *fraternella*. Abdomen ochreous, crossed with fuscous bands in *fraternella*; coremata absent in *loxotoma* and *fraternella*, on surface of sternite in *meridionalis* (Fig. 26).

GENITALIA ♂. Digitate processes of juxta not reaching anterior margin of gnathos apex, except in *major*.

REMARKS. The species of this group can easily be distinguished from others by the crest of long scales on the thorax; from the *albella*-group also by their fuscous colour, from the *leucocapna*-group by the stalked veins  $CuA_1$  and  $CuA_2$  of the fore wing, and from *parvifusca* by the larger size and veins  $R_4$  and  $R_5$  free on the fore wing.

*Timocratica major* (Busck)

(Figs 14, 28, 63, 79, 80, 154)

*Stenoma major* Busck, 1911: 212, pl. 8, fig. 8. Holotype ♂, PERU: Lima, Callao (*Pusey*) (NMNH) [not examined].

*Timocratica major* (Busck) Meyrick, 1912: 707 [list]; Busck, 1935: 17 [catalogue].

♂ 22–25 mm. Head pale yellow, ochreous towards clypeus; vertex and crown with grey and ochreous-tipped scales. Second segment of labial palpus ochreous, whitish internally above; third segment whitish. Antenna pale yellow, scape with greyish-tipped scales; flagellum progressively fuscous from base to apex, ciliation half diameter of flagellum. Thorax pale yellow with greyish and ochreous-tipped scales. Fore wing with apex pointed, pale yellow; margins, oblique fasciae, and fold ochreous; underside golden-ochreous. Hind wing pale golden-yellow, cilia golden. Legs ochreous, paler above; fore tarsus dark ochreous on outer side. Abdomen ochreous.

♀ 26 mm. Slightly darker than male. Fore wing irrorate with ferruginous scales; margins, fasciae, fold and cilia ferruginous.

GENITALIA ♂ (Figs 79, 80). Uncus slightly narrowed at middle; apex strongly concave, nearly bifurcate. Apex of gnathos blunt. Digitate processes of juxta narrow and long, overlapping proximal side of gnathos, curved inwards, covered with setae towards apex. Anterior margin of vinculum nearly straight. Valvae progressively broadening distad; sacculus slightly expanded; apex evenly rounded. Aedeagus bent ventrad at base, slightly dilated medially; vesica with single strong cornutus.

GENITALIA ♀ (Fig. 154). Ostium bursae narrow, margin straight. Antrum short. Ductus bursae about twice as long as corpus bursae, nearly cylindrical, walls slightly wrinkled. Corpus bursae globular, walls smooth. Signum an elongate plate, slightly constricted at middle, weakly sclerotized along and across middle.

REMARKS. *T. major* is easily separated by its pointed fore wings; these are rounded in all other species in the group.

Busck (1911) stated that the median and post-median fasciae reach the dorsum, but they merely reach the fold, and on  $M_3$  the post-median forms an acute angle with a fascia that follows the fold, parallel to the tornus. Busck also stated that the alar expanse was 50–60 mm, but it was impossible to find specimens larger than 55 mm amongst the material studied. The presence of a thoracic crest in this species is not clear. All the specimens examined have the thorax more or less rubbed, except one which has some long, loose scales around the pin, which may indicate the presence of this character. The shape of the juxta and valva is somewhat unusual for this group. No other species has the digitate processes of the juxta overlapping the proximal side of the gnathos, nor the characteristic expansion of the sacculus. This is also the only species in the genus with such a long ductus bursae.

DISTRIBUTION (Fig. 28). Brazil (Amazonian Basin and Central Plateau), Peru (Pacific coast [probably erroneous, see below]). This species is presumably associated with Tropical Moist Forest as indicated by the specimens collected in Borba and Fonte Boa, Amazonas (dots in lowest hexagon of Fig. 28). The specimens from 'Callao, Peru' are probably mislabelled as this locality is in a desert area. The specimens from Mato Grosso and Goiás come from an area covered predominantly by two associations. The savanna-type vegetation, called 'cerrado' in Brazil, covers most of the area and is the result of the monsoon-type of rainfall, corresponding to an 'atmospheric association' in Holdridge's system. The other association is represented by gallery-forests along the river banks. These gallery forests represent the climatic association of the area. Thus, the two dots which represent the two localities in Goiás and Mato Grosso (Fig. 28) could be moved further to the right, probably over the 2000-precipitation line, and falling very close to the other two dots which represent the most likely ecological association of *major*.

## MATERIAL EXAMINED

8 ♂, 1 ♀ (4 ♂, 1 ♀ genitalia preparations).

**Peru:** 1 ♂ (paratype), Lima, Callao (*Pusey*) (BMNH). **Brazil:** 5 ♂, Mato Grosso, Rio Brilhante, 22.x.1970 (*Becker*) (VB; BMNH; NMNH); 1 ♀, Amazonas, Fonte Boa, vii.1906 (*Klages*) (BMNH); 1 ♂, Amazonas, Borba, Rio Madeira, x.1943 (*Pohl*) (NMNH); 1 ♂, Goiás, Leopoldo Bulhões, x.1935 (*Spitz*) (BMNH).

*Timocratica agramma* sp. n.

(Figs 28, 55, 81, 82)

♂ 30 mm. Head fuscous. Labial palpus dark ochreous; second segment above and third segment fuscous. Antenna fuscous. Thorax fuscous, crest dark brown. Fore wing fuscous, costa ferruginous-ochreous, dorsum ferruginous, oblique fasciae indistinct; underside golden-yellow, deep golden-yellow along margins. Hind wing golden-ochreous, cilia and dorsum deep golden-ochreous. Legs deep golden-ochreous, fore tarsus dark fuscous above; third to fifth segments of mid tarsus fuscous brown.

GENITALIA ♂ (Figs 81, 82). Uncus narrow, lateral margins nearly parallel; apex medially concave. Apex of gnathos sharply pointed, strongly sclerotized. Digitate processes of juxta straight, apex with several setae. Valva with margins nearly parallel, basal third of ventral margin slightly sinuous. Aedeagus slightly bent ventrad, vesica with a single strong, pointed cornutus.

REMARKS. *T. agramma* is easily separated from others in this group by the absence of distinctive oblique fasciae on the fore wings.

DISTRIBUTION (Fig. 28). Brazil (Atlantic coast). The data 'Espírito Santo' on the label of the only specimen known are not precise enough. However, it can be assumed that the specimen was collected in the lowlands around the capital, Vitória, and the species may belong to a transitional association between the Tropical Dry Forest and the Subtropical Moist Forest.

## MATERIAL EXAMINED

Holotype ♂, **Brazil:** Espírito Santo (*Johnson*) (NMNH).

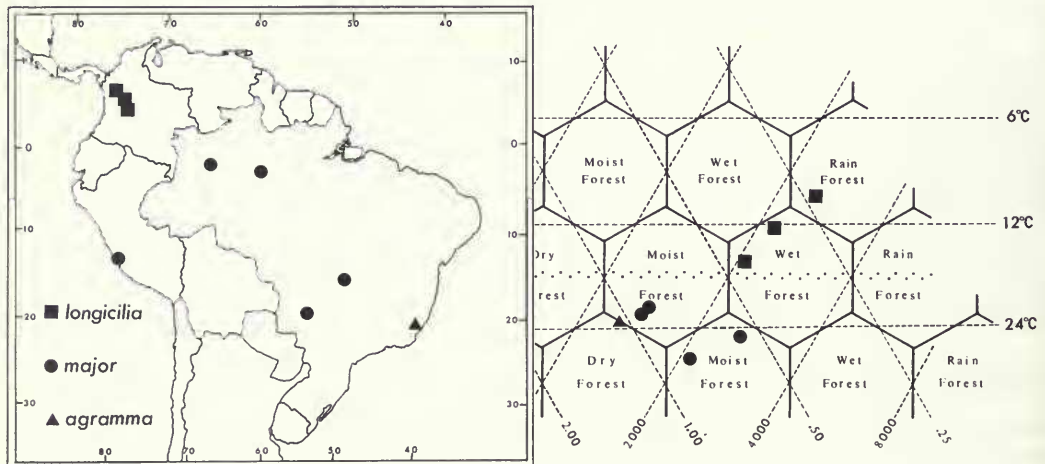


Fig. 28 Geographical and ecological distribution of the *monotonia*-group of *Timocratica*.

*Timocratica longicilia* sp. n.

(Figs 28, 56, 83–85)

♂ 28–30 mm. Head fuscous, frons whitish edged with ochreous and fuscous scales, vertex and crown brownish fuscous. Second segment of labial palpus dark ochreous, brownish fuscous above; third segment brownish fuscous. Antenna pale yellow, scape fuscous, distal half of flagellum progressively darker towards apex, ciliation one and a half times diameter of flagellum. Thorax fuscous, dark brown along middle, apex of

crest scales dark brownish fuscous. Fore wing light fuscous; costa ochreous to ferruginous; termen, dorsum, oblique fasciae and cilia fuscous; golden-yellow below. Hind wing golden-yellow, cilia deep golden-yellow. Legs deep golden-yellow; fore tarsus brownish fuscous above, darker outwardly; mid tarsus slightly tinged with fuscous above. Abdomen deep ochreous, fourth to seventh tergites tinged with brownish fuscous.

GENITALIA ♂ (Figs 83–85). Uncus broad, lateral margins converging slightly towards apex, apex slightly concave. Apex of gnathos folded, not strongly sclerotized as in other species. Digitate processes of juxta short, dorsal side and apex with several setae. Valva very broad, costal margin nearly straight, ventral margin evenly rounded. Aedeagus bent ventrad, vesica with a single, broad-based, sharply pointed cornutus.

REMARKS. *T. longicilia* can easily be distinguished from other species in this group by its relatively long antennal ciliation and by the brownish fuscous third segment of the labial palpus. It is the only species in the group which has the base of the valva narrower than the distal part. Like *major* and *agramma*, from which it is very distinct externally, it has a single strong cornutus in the vesica. The specimen from Antioquia, Mesopotamia has the distal half of the valva slightly narrower than the typical form. Possibly it is a lowland form of the species.

DISTRIBUTION (Fig. 28). Colombia (Oriental Cordillera and Mesopotamia). This species represents the genus in the high mountains of Colombia, in the Tropical Montane and Tropical Lower Montane Wet Forest. No other species in the genus is known to occur in these two Life Zones.

MATERIAL EXAMINED

3 ♂ (2 ♂ genitalia preparations).

Holotype ♂, Colombia: Tolima, Mt Tolima, 3200 m (*Fassl*) (BMNH).

Paratypes. Colombia: 1 ♂, Tolima, Mt del Eden, Ibagué, 2700 m, xii.1909 (*Fassl*) (BMNH); 1 ♂, Antioquia, Mesopotamia, 1500 m ('5000 ft') (NMNH).

*Timocratica pompeiana* (Meyrick)

(Figs 29, 57, 86, 87)

*Timocratica pompeiana* Meyrick, 1925: 176; Busck, 1935: 17 [catalogue]; Clarke, 1955: 391, pl. 195, figs 4–4b [adult, genitalia]. Holotype ♂, PERU (BMNH) [examined].

♂ 27–30 mm. Head whitish, frons edged with fuscous, vertex and crown with fuscous scales. Second segment of labial palpus with basal half ochreous, dark grey above, outer half above and near articulations whitish; third segment whitish, fuscous below. Antenna fuscous; scape whitish, basal half above with fuscous scales. Thorax fuscous, dark fuscous along middle; crest dark brown, patagia pale yellow, tegulae fuscous. Fore wing fuscous, costa deep ochreous to ferruginous brown, termen, dorsum, oblique fasciae and fold ferruginous brown, cilia fuscous, dark ochreous below. Hind wing golden-ochreous, cilia and dorsum deep golden-ochreous. Legs deep golden-ochreous, fore tarsus fuscous above, dark brown on claws; mid tarsus and third to fifth segments of hind tarsus fuscous brown above. Abdomen deep golden-ochreous.

GENITALIA ♂ (Figs 86, 87). Uncus nearly triangular, base broad, tapering strongly towards apex. Apex of gnathos flat and rounded. Digitate processes of juxta straight, dorsal side of apex with several setae. Valva very broad basally, ventral margin strongly curved near middle. Aedeagus bent ventrad at basal third, vesica with strong, bent cornutus and several smaller spines opposite.

REMARKS. *T. pompeiana* is a little larger than *monotonia* but otherwise very similar externally. The only difference is in the shape of the valva; in *pompeiana* it is nearly triangular with a very broad base, while in *monotonia* the margins are almost parallel. *T. pompeiana* could be a local form of *monotonia*, as variation of genitalia has been found in different populations of the latter. This view is supported by the ecological distribution of both forms as discussed below. However, *pompeiana* is retained as a distinct species until further material and information is available.

DISTRIBUTION (Fig. 29). Peru (eastern side of the Andes). All specimens were collected in the same place, the locality being Tropical Premontane Wet Forest. This is also the Life Zone of *monotonia* and suggests that *pompeiana* could be a local form of that species.

MATERIAL EXAMINED

5 ♂ (3 ♂ genitalia preparations).

Peru: holotype ♂, Carabaya, La Oroya (BMNH); 4 ♂, Puno, Carabaya, La Oroya, R. Inambari, iii.1905 (*Ockenden*) (BMNH).

*Timocratica monotonia* (Strand)

(Figs 6, 9, 12, 25, 29, 58, 88–93, 155)

*Cryptolechia monotonia* Strand, 1911: 151; 1914: 58, pl. 11, fig. 18 [redescr., adult]. Holotype ♀, ECUADOR: Macas (colln Niepelt) [not traced].

*Timocratica isographa* Meyrick, 1912: 707; 1925: 176 [addition to descript.]; Busck, 1935: 17 [catalogue]; Clarke, 1955: 384, pl. 192, figs 1–1d [adult, wing venation, genitalia]. Holotype ♂, VENEZUELA (BMNH) [examined]. **Syn. n.**

*Timocratica claudescens* Meyrick, 1925: 177; Busck, 1935: 16 [catalogue]; Clarke, 1955: 387, pl. 193, figs 4–4a [adult, genitalia]. Lectotype ♂, PERU (BMNH), designated by Clarke (1955: 387) [examined]. **Syn. n.**

*Timocratica crassa* Meyrick, 1925: 177; Busck, 1935: 16 [catalogue]; Clarke, 1955: 388, pl. 194, figs 1–1a [adult, genitalia]. Lectotype ♂, BRAZIL (BMNH), designated by Clarke (1955: 388) [examined]. **Syn. n.**

*Timocratica monotonia* (Strand) Busck, 1935: 17 [catalogue].

♂ 20–24 mm, ♀ 26–28 mm. Head whitish fuscous, frons edged with dark ochreous and fuscous scales; vertex and crown with fuscous scales, darker along middle. Second segment of labial palpus deep ochreous, dark grey above, whitish near outer articulation; third segment whitish with dark fuscous scales towards apex, slightly tinged with ochre above. Scape whitish, with fuscous-tipped scales above; flagellum fuscous, diffusely ringed with whitish scales on articulations; ciliation about diameter of flagellum. Thorax fuscous, dark brown along middle, scales whitish basally; tegula slightly edged with ochreous scales; crest dark brown apically. Fore wing fuscous, scales whitish basally; costa deep ochreous to ferruginous brown; termen, dorsum, oblique fasciae and fold ferruginous brown; cilia fuscous, pale ochreous basally; underside dark golden-ochreous. Hind wing golden-ochreous, dorsum and cilia deep golden-ochreous. Legs golden-ochreous; fore tarsus whitish fuscous above, progressively darker distally. Abdomen deep golden-ochreous.

**GENITALIA** ♂ (Figs 88–93). Lateral margins of uncus parallel or narrowing slightly towards apex. Apex of gnathos variable, gradually to abruptly tapered. Juxta with digitate processes straight or with internal margins slightly sinuate. Margins of valva nearly parallel or valva broader at base and strongly angled at one-third; apex evenly rounded. Aedeagus bent ventrad; vesica with several cornuti on dorsal side, several smaller acute spines ventrally.

**GENITALIA** ♀ (Fig. 155). Ostium bursae wide, margin shallowly convex. Antrum conical, anterior part constricted, wrinkled longitudinally. Ductus bursae widening gradually towards corpus bursae. Corpus bursae pear-shaped, walls smooth as in ductus bursae. Signum a single elongate plate.

**REMARKS.** *T. monotonia* is very similar externally to *pompeiana* and *meridionalis*. The former is larger and has the basal half of the valva very broad. The latter has a distinctive lighter area on the basal half of the fore wing and the coremata on the abdomen attached to the sternite surface.

Although there are no good external features to distinguish specimens from different localities, Meyrick described this species three times, giving no evidence as to why he believed they were

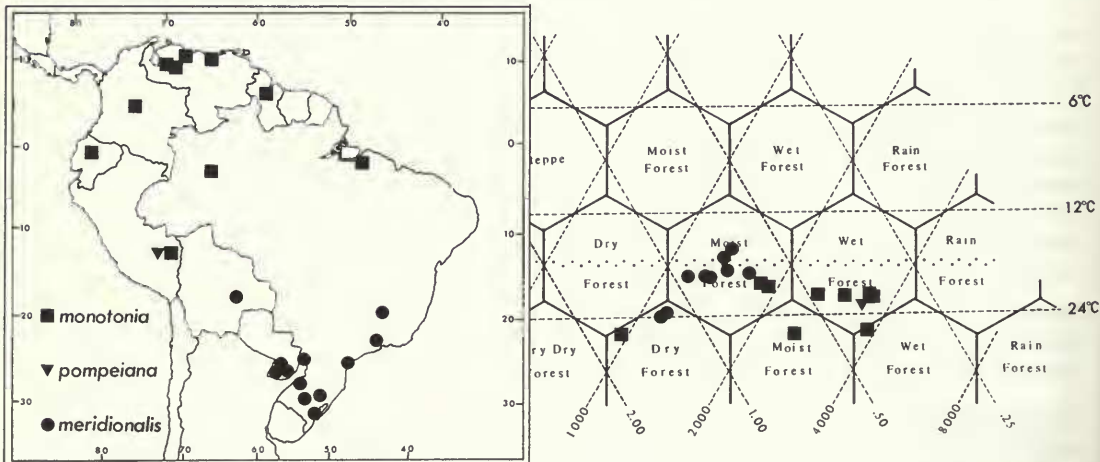


Fig. 29 Geographical and ecological distribution of the *monotonia*-group of *Timocratica*.



different. The male genitalia exhibit slight differences between specimens from different places, but seem to be constant in those from the same locality. This is regarded as geographic variation as specimens from places between the type-localities have intermediate genitalia.

The type of *monotonia* has not been traced. According to Horn & Kahle (1936: 191, 270), Niepelt's collection was sold, the Strand types being deposited in the MNHU and IP. Dr. H.-J. Hannemann and Dr. R. Gaedike of these respective institutions were unable to find the type (pers. comm.), nor could it be traced at the BMNH where part of the Niepelt collection is now deposited.

According to Strand's figure *monotonia* can be associated with only three species: *isographa*, *longicilia*, and *pompeiana*. It is unlikely that it represents either *longicilia* or *pompeiana*, as the former is known only from the high mountains of Colombia, and the latter (which could be a local form of *isographa*) from the type-locality in southern Peru. The third species, *isographa* (with its synonyms *crassa* and *claudescens*), is widely distributed in the north of South America including Ecuador; in my opinion *monotonia* belongs to the same population and is the senior name for this species.

**DISTRIBUTION** (Fig. 29). Brazil (Amazonian Basin), Guyana, Colombia, Ecuador, Peru, Venezuela.

Despite its wide geographic distribution, this species appears to be associated mainly with only two Life Zones, Tropical Moist Forest and Tropical Premontane Wet Forest. The specimen from Palma Sola, Venezuela, which is in the Tropical Dry Forest, presumably is associated with gallery forests in this savanna area.

#### MATERIAL EXAMINED

21 ♂, 3 ♀ (11 ♂, 2 ♀ genitalia preparations).

**Brazil:** lectotype ♂ of *T. crassa*, Pará, Belém, vii.1919 (Parish) (BMNH); 8 ♂, Pará, Belém ['Pará'] (*Moss*) (BMNH); 1 ♂, 1 ♀, Amazonas, Fonte Boa (*Klages*) (BMNH). **Guyana:** 1 ♂, Essequibo, Potaro, v.1908 (*Klages*) (BMNH). **Colombia:** 1 ♂, Cundinamarca, Medina (*Fassl*) (BMNH). **Ecuador:** 1 ♀, Pichincha, Santo Domingo de los Colorados, 14.ii.1959 (*Hodges*) (NMNH). **Venezuela:** holotype ♂ of *T. isographa*, Falcón, Palma Sola (BMNH); 1 ♂, Aragua, Rancho Grande, 4.vi.1968 (*Feige*) (VB); 1 ♂, 1 ♀, same data, 1100 m, 10.iv, 10.v.1967 (*Salcedo & Rodriguez*) (VB); 1 ♂, Falcón, Palma Sola (BMNH); 2 ♂, Las Quinguas, near San Esteban (*Klages*) (BMNH); 1 ♂, San Esteban (*Klages*) (BMNH). **Peru:** lectotype ♂ of *T. claudescens*, Puno, San Gabán, iv.1913 (BMNH); 1 ♂ (paralectotype of *T. claudescens* Meyrick), Puno, San Gabán [river], 760 m ('2500 ft'), iv.1913 (NMNH).

#### *Timocratica meridionalis* sp. n.

(Figs 26, 29, 59, 94, 95, 156)

[*Timocratica claudescens* Meyrick; Biezanko, 1961b: 6. Misidentification.]

♂ 23–28 mm. Head whitish, frons edged with ferruginous, vertex and crown dark fuscous along middle. Second segment of labial palpus dark ochreous, whitish with fuscous scales above and around distal articulations; third segment whitish with fuscous scales below. Scape whitish fuscous above; flagellum whitish at base, progressively fuscous towards apex. Thorax light fuscous, ferruginous brown along middle; crest dark brown apically; tegula edged with ochreous scales. Fore wing light fuscous; basal half between *R* and *costa* whitish; *costa* ochreous to ferruginous; apex, termen, tornus, and oblique fasciae ferruginous brown; fold with ochreous scales; cilia fuscous; underside dark ochreous. Hind wing golden-ochreous, cilia and dorsum deep golden-ochreous. Legs deep golden-ochreous; fore tarsus whitish with grey scales above, progressively dark brown outwards; mid tarsus dark fuscous brown above; third to fifth segments of hind tarsus fuscous brown. Abdomen deep golden ochreous.

♀ 26–30 mm. Lighter than male; second segment of labial palpus without grey scales above.

**GENITALIA** ♂ (Figs 94, 95). Uncus narrow, lateral margins progressively convergent towards apex; apex rounded. Apex of gnathos short, blunt. Digitate processes of juxta nearly straight, distal half dorsally and apex with several long setae. Valva strongly curved near basal third, then with margins almost parallel; apex evenly rounded. Aedeagus bent ventrad, slightly narrower at middle; vesica with short, bent cornutus and few sharply pointed, smaller spines.

**GENITALIA** ♀ (Fig. 156). Margin of ostium bursae straight. Antrum with lateral margins almost parallel. Ductus bursae broadening progressively towards corpus bursae. Corpus bursae pear-shaped. Signum a single plate, weakly sclerotized along middle.

REMARKS. *T. meridionalis*, the southern species in the group, is very similar to *monotonia* but can easily be distinguished by the lighter area on the basal half of the fore wing between *R* and the costa, and by the genitalia. Although this species also has coremata on the second abdominal sternite, these are not located in pockets but are attached to the sternite surface (Fig. 26). This is probably an intermediate development between *loxotoma* and *fraternella* which lack coremata, and the remaining species of the genus which have them located in pockets (Fig. 25).

It was impossible to examine the material studied by Biezanko (1961b: 6), but it certainly belongs to *meridionalis* and not to *claudescens* which is a synonym of *monotonia*, a species occurring in the tropical areas of northern South America.

BIOLOGY. Like *palpalis*, this species emerges earlier (October) in the northern and warmer areas of its range, and later (February to March) in the southern areas. This seems to indicate that it is univoltine in southern, colder regions, but further collecting from the northern and warmer localities may show that it is bivoltine in these areas.

DISTRIBUTION (Fig. 29). Southern Brazil, Paraguay and Bolivia. This species is the only representative of the *monotonia*-group in the Warm Temperate and Subtropical regions of South America. It is restricted to two Life Zones, Warm Temperate Moist Forest and Subtropical Lower Montane Moist Forest.

#### MATERIAL EXAMINED

21 ♂, 8 ♀ (7 ♂, 2 ♀ genitalia preparations).

Holotype ♂, **Brazil**: Paraná, Curitiba, 920 m, 12.iii.1975 (Becker) (MN).

Paratypes. **Brazil**: 1 ♂, 1 ♀, Minas Gerais, Sete Lagoas, 720 m 18–20.x.1969 (Becker) (VB); 1 ♂, São Paulo, Ipiranga, iii.1926 (Spitz) (BMNH); 1 ♀, São Paulo, São Bernardo, iii.1926 (Spitz) (BMNH); 2 ♂, 1 ♀, São Paulo, Piracicaba, 14–19.i.1966 (ESALQ); 9 ♂, 4 ♀, Paraná, Curitiba, 920 m, 15.ii–20.iii.1975 (Becker) (VB; BMNH; NMNH; MNHU; NM); 1 ♂, 1 ♀, Paraná, Iguazu, 20.ii–5.iii.1922 (BMNH); 1 ♂, Rio Grande do Sul, Elsenau, 1905 (Martin) (BMNH); 1 ♂, Rio Grande do Sul, Santa Maria, 25.iii.1971 (Link) (VB); 1 ♂, Rio Grande do Sul, Pelotas, 14.ii.1961 (Biezanko) (VB). **Bolivia**: 1 ♀, Santa Cruz, Prov. del Sara, 450 m (Steinbach) (BMNH). **Paraguay**: 1 ♀, Irapá, 20.x.1924 (BMNH); 1 ♂, Sapucay, 20.i.1905 (Forster) (BMNH); 1 ♂, Villa Rica (Jørgensen) (NMNH).

Excluded from type-series. [South Africa:] 1 ♂, Natal, Stellenbosch (C.K.B.) (BMNH) [mislabelled].

### *Timocratica loxotoma* (Busck)

(Figs 27, 30, 60, 96, 97, 157)

*Stenoma loxotoma* Busck, 1910: 212; Walsingham, 1913: 179 [list]. Holotype ♂, MEXICO: Vera Cruz, Orizaba, vi (Müller) (NMNH) [not examined].

*Timocratica loxotoma* (Busck) Busck, 1935: 17 [catalogue].

♂ 20–22 mm. Head whitish, frons edged with fuscous, vertex and crown with fuscous scales along middle. Second segment of labial palpus deep ochreous below, dark fuscous above, pale distally, third segment pale fuscous. Antenna whitish fuscous. Thorax fuscous above, dark fuscous along middle, apical half of prest scales dark fuscous brown. Fore wing light fuscous; costa, apex, termen, dorsum, oblique fasciae and fold ferruginous brown; cilia fuscous. Hind wing and underside of fore wing golden-ochreous. Legs deep golden-ochreous; fore tarsus light fuscous above, dark fuscous on claws, mid tarsus progressively dark fuscous towards claws. Abdomen deep golden-ochreous above, paler below.

♀ 22–28 mm. Slightly paler than male. Second segment of labial palpus without fuscous tinge above.

GENITALIA ♂ (Figs 96, 97). Margins of uncus nearly parallel, apex slightly concave. Digitate expansions of juxta nearly straight, with few setae apically. Margins of valva nearly parallel. Aedeagus bent ventrad, vesica with several long spines dorsally.

GENITALIA ♀ (Fig. 157). Margin of ostium bursae expanded posteriorly, concave medially. Antrum slightly constricted at middle, with longitudinal wrinkles anteriorly. Ductus bursae broadening progressively towards corpus bursae. Corpus bursae globular, walls smooth. Signum an elongate plate weakly sclerotized at middle.

REMARKS. Although this Central American species is very similar to *monotonia* externally, it can easily be distinguished in the male as it lacks coremata on the second abdominal sternite (Fig. 27). The female can be distinguished by the shape of the margin of the ostium bursae and by the wide, globular corpus bursae.

**DISTRIBUTION** (Fig. 30). Mexico (Gulf of Mexico and Yucatán Peninsula), Guatemala and Costa Rica. This species is associated with a wide range of Life zones and has been collected from Tropical Dry Forest and Tropical Moist Forest, up to Tropical Premontane Wet Forest.

**MATERIAL EXAMINED**

13 ♂, 5 ♀ (3 ♂, 2 ♀ genitalia preparations).

**Mexico:** 1 ♂ paratype, Veracruz, Veracruz (*Schwarz*) (BMNH); 3 ♂, Veracruz, Huatuxco (BMNH); 3 ♂, Campeche, Escarcega, 30.ix.1973 (*Becker*) (VB); 1 ♂, San Luis Potosi, Palitla, 5.viii.1966 (*Flint*) (NMNH); 1 ♂, San Luis Potosi, Tamazunchale, 26.vi.1965 (*Flint*) (NMNH). **Guatemala:** 1 ♂, Chejel, vi (*Schaus*) (NMNH); 1 ♂, Petén, Tikal, 19–22. ix.1973 (*Becker*) (VB). **Costa Rica:** 3 ♀, Cartago, Turrialba, 10.ix.1971, 10.x.1971, 10.xii.1971 (*Becker*) (VB); 1 ♀, Cartago, Turrialba, 10.vi.1972 (*Becker*) (BMNH).

*Timocratica* species 1

(Figs 30, 62, 158)

♀ 23–24 mm. Similar to *loxotoma* and *monotonia*. Hind wing yellowish-fuscous. Abdomen golden-ochreous.

**GENITALIA** ♀ (Fig. 158). Margin of ostium bursae rounded, expanded posteriorly. Antrum slightly constricted posteriorly, anterior half wrinkled longitudinally. Ductus bursae constricted posteriorly, widening progressively towards corpus bursae, wrinkled longitudinally. Corpus bursae globular. Signum a nearly circular, diffuse plate.

**REMARKS.** The two females considered here are very similar to *loxotoma* and *monotonia* but their hind wings are yellowish-fuscous, not golden-ochreous. The genitalia are very close to those of *loxotoma* but the margin of the ostium bursae is evenly rounded, whereas it is concave in *loxotoma*. Their yellowish-fuscous hind wings suggest some relationship with *fraternella*, and they could well represent the female of that species, but as they are very much lighter and in poor condition it seems better not to name them until more material is available for study.

**DISTRIBUTION** (Fig. 30). Costa Rica (known only from Turrialba). This species occurs with *fraternella* in the same Life Zone, viz., Tropical Premontane Wet Forest.

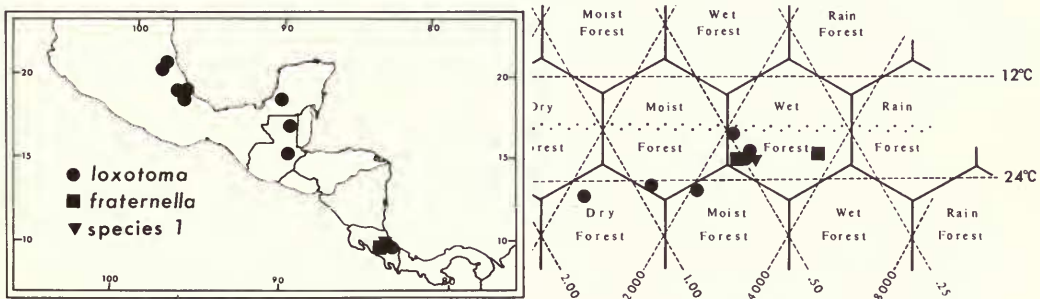


Fig. 30 Geographical and ecological distribution of the *monotonia*-group of *Timocratica*.

**MATERIAL EXAMINED**

2 ♀ (2 ♀ genitalia preparations)

**Costa Rica:** 2 ♀, Cartago, Turrialba, 600 m, 15.vii, 20.x.1972 (*Becker*) (VB; BMNH).

*Timocratica fraternella* (Busck)

(Figs 30, 61, 98, 99)

*Stenoma fraternella* Busck, 1910: 80; Walsingham, 1913: 179 [list]. Holotype ♂, COSTA RICA: Cartago, Juan Viñas (*Schaus*) (NMNH) [not examined].

*Timocratica fraternella* (Busck) Busck, 1935: 16 [catalogue].

♂ 14–19 mm. Head whitish, frons edged with fuscous; crown with fuscous scales along middle. Labial palpus bright fuscous, second segment dark fuscous above, third segment progressively dark fuscous towards apex.

Antenna fuscous, scape whitish. Thorax fuscous, apex of crest scales dark brownish-fuscous, metascutum and first abdominal tergite yellowish-fuscous. Fore wing dark shiny fuscous, costa edged with deep ochre; termen, dorsum, oblique fasciae and fold dark brownish-fuscous. Hind wing dark shiny fuscous. Legs deep golden-ochreous; fore tarsus light fuscous above, dark fuscous distally; mid tarsus dark fuscous above; hind claws dark fuscous. Abdomen deep golden-ochreous; tergites crossed with dark fuscous bands near articulations.

GENITALIA ♂ (Figs 98, 99). Uncus slightly dilated medially. Apex of gnathos short, blunt. Digitate processes of juxta straight, gently narrowed at middle; dorsal side of apex with several short setae. Valva with margins nearly parallel, ventral margin evenly rounded at basal third. Aedeagus with basal third strongly curved ventrad; vesica with several spines on dorsal side, progressively longer distally.

REMARKS. *T. fraternella* is easily separated from other species in this group by its dark fuscous hind wings, and from *parvifusca* by its oblique fasciae on the fore wings. The male genitalia are very similar to those of *loxotoma* and, as in that species, lack the pair of coremata on the second abdominal sternite.

DISTRIBUTION (Fig. 30). Costa Rica. Known only from the type-locality, Juan Viñas, and Turrialba, about 20 km distant. Both localities are in Tropical Premontane Wet Forest.

#### MATERIAL EXAMINED

5 ♂ (2 ♂ genitalia preparations).

**Costa Rica:** 1 ♂, 1910 (*Lankaster*) (BMNH); 1 ♂ paratype, Cartago, Juan Viñas (*Schaus*) (BMNH); 2 ♂, Cartago, Turrialba, 10.xi.1971 (*Becker*) (VB); 1 ♂, Cartago, Turrialba, 10.v.1973 (*Becker*) (VB).

### The *leucocapna*-group

♂, ♀, 18–26 mm. Head whitish, vertex with fuscous or brownish scales. Third segment of labial palpus one-third length of second, nearly straight. Thorax without crest of long scales, covered with fuscous and whitish scales. Fore wing elongate; basal half of costa nearly straight, distal half evenly rounded, apex acutely angled; veins free; dark fuscous, basal half with yellow scales between *Rs* and costa, diffuse whitish area crossed with dark fuscous veins beyond cell. Hind wing golden-yellow. Abdomen golden-yellow with dark fuscous scales on tergites in some specimens; coremata located in pockets.

GENITALIA ♂. Digitate processes of juxta not reaching anterior margin of gnathos apex.

REMARKS. This group can be easily distinguished from the *monotonia*-group and *parvifusca* by the free veins of the fore wing, and from the *albella*-group by the dark fuscous fore wings.

### *Timocratica leucocapna* (Meyrick) comb. rev.

(Figs 5, 8, 15, 31, 66, 100, 101, 159)

*Lychnocrates leucocapna* Meyrick, 1926: 227; Clarke, 1955: 224, pl. 112, figs 1–1d [adult, wing venation, genitalia]. Holotype ♂, COLOMBIA (BMNH) [examined].

*Timocratica leucocapna* (Meyrick) Busck, 1935: 17 [catalogue].

♂ 18–22 mm, ♀ 26 mm. Head whitish, frons light ochreous, progressively deep ochreous towards clypeus, vertex suffused with fuscous. Haustellum covered with white scales at base. Second segment of labial palpus ochreous, slightly tinged with fuscous below near distal articulations, white dorsally; third segment white, dark fuscous below. Antenna with scape whitish, slightly tinged with ochreous, flagellum white basally, basal half ochreous suffused with fuscous, then progressively ochreous towards apex. Thorax whitish, suffused with fuscous; patagium whitish; tegula light fuscous. Fore wing dark fuscous, basal half between *Rs* and costa ochreous with white scales; a large, diffuse, whitish area beyond cell, crossed with dark fuscous veins; cilia dark fuscous with white dots near veins; underside ochreous. Hind wing light to golden-ochreous. Legs ochreous, fore tibia and tarsus dark fuscous with white scales on articulations, mid and hind tarsi with dark fuscous scales above. Abdomen ochreous, some specimens with third to sixth tergites dark fuscous.

GENITALIA ♂ (Figs 100, 101). Uncus with lateral margins nearly parallel, posterior margin concave, slightly broadened in some specimens. Apex of gnathos pointed, bent posteriorly. Digitate processes of juxta straight or bent gently inwards near apex, apex with several setae. Valva with margins nearly parallel or somewhat broadened at middle. Aedeagus bent ventrad; vesica with two cornuti, a strong one and another smaller, on the opposite side.

**GENITALIA ♀** (Fig. 159). Ventral margin of ostium bursae expanded posteriorly, falcate at middle. Antrum slightly constricted anteriorly. Ductus bursae twisted posteriorly, nearly cylindrical, broadening progressively towards corpus bursae. Corpus bursae nearly globular. Signum a single irregular plate.

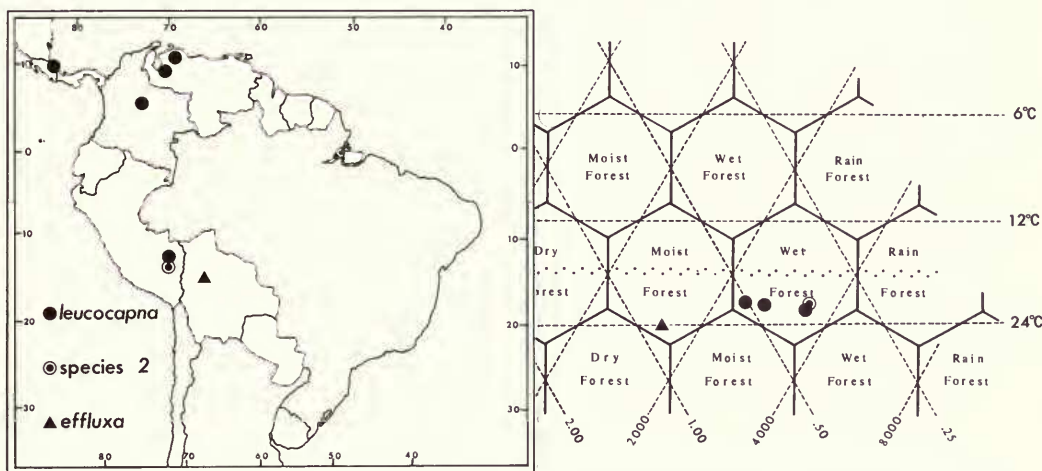
**REMARKS.** *T. leucocapna* is easily distinguished from *effluxa* by the absence of fuscous on the hind wing margins. The specimens from Turrialba, Costa Rica, have the abdomen plain golden-ochreous; some have the hind wings deep golden-ochreous.

**DISTRIBUTION** (Fig. 31). Costa Rica, Colombia, Peru and Venezuela. Despite its wide geographical distribution this species appears to be confined to a single Life Zone, Tropical Premontane Wet Forest.

**MATERIAL EXAMINED**

16 ♂, 1 ♀ (5 ♂, 1 ♀ genitalia preparations).

**Costa Rica:** 1 ♂, 1 ♀, Cartago, Turrialba, 600 m, 17–22. ii.1965 (*Duckworth*) (NMNH); 5 ♂, Cartago, Turrialba, 15.vii, 10.ix.1971, 10.iv.1972 (*Becker*) (VB; BMNH). **Colombia:** holotype ♂, Cundinamarca, Medina, 500 m ('1650 ft') (BMNH); 2 ♂, Cundinamarca, Medina (*Fassl*) (BMNH). **Peru:** 3 ♂, La Oroya, R. Inambari, 1000 m ('3100 ft'), iii, xi–xii.1906 (*Ockenden*) (BMNH). **Venezuela:** 2 ♂, Barinas, La Chimenea, 5 km south La Soledad, 1500 m, 28–29.v.1975 (*Dietz*) (VB; UCV); 1 ♂, Lara, Anzoategui, Quebrada Guacó, 1440 m, 13–16.vi.1972 (*Salcedo & Zambrano*) (UCV).



**Fig. 31** Geographical and ecological distribution of the *leucocapna*-group of *Timocratica*.

*Timocratica* species 2

(Figs 31, 65)

♂ 26 mm. Similar to *leucocapna*. Fore wing with the ochreous area on the basal half less pronounced; area beyond cell darker.

**GENITALIA ♂.** Similar to those of *leucocapna*.

**REMARKS.** The only specimen representing this form was collected in the same locality as three specimens of typical *leucocapna*. It is larger than any male of the series representing *leucocapna* and quite distinctive, but its genitalia are almost identical. As in *effluxa*, more material is necessary to clarify this form.

**DISTRIBUTION** (Fig. 31). Peru (eastern slopes of the Andes), in Tropical Premontane Wet Forest, a Life Zone where *leucocapna* also occurs.

**MATERIAL EXAMINED**

**Peru:** 1 ♂, Puno, La Oroya, Rio Inambari, 1000 m ('3100 ft'), iii.1905 (*Ockenden*) (BMNH).

*Timocratica effluxa* (Meyrick)

(Figs 31, 64, 102, 103)

*Lychnocrates effluxa* Meyrick, 1930: 19. Holotype ♂, BOLIVIA (BMNH) [examined].*Timocratica effluxa* (Meyrick) Busck, 1935: 16 [catalogue]; Clarke, 1955: 388, pl. 194, figs 2–2b [adult, genitalia].

♂ 20 mm. Head whitish, tinged with light ochreous; vertex with long brownish-fuscous scales. Second segment of labial palpus ochreous, dark fuscous above; third segment white basally, with dark fuscous scales towards apex. Antenna fuscous, scape with white scales, distal half of flagellum with ochreous scales. Thorax fuscous, with white scales. Fore wing dark fuscous, veins darker than ground colour, sparsely mixed with white scales; white streak poorly defined at base, between  $R_s$  and  $Sc$ ; a diffuse white area crossed with fuscous veins beyond cell, not reaching margins; cilia dark fuscous with white spots near veins; underside ochreous, distal quarter fuscous. Hind wing ochreous, termen and dorsum fuscous; cilia fuscous. Legs ochreous, fore tarsus dark fuscous, mid and hind tarsi with dark fuscous scales.

GENITALIA ♂ (Figs 102, 103). Similar to *leucocapna*.

REMARKS. *T. effluxa* is easily recognized by the fuscous borders of its hind wings. Although its genitalia are almost identical to those of *leucocapna* it seems to be a distinct species. The colour pattern of the wings in *leucocapna* shows little variation, the hind wings are plain golden-ochreous and the fore wings have a distinctive ochreous area on the basal half between  $R_s$  and the costa. All these features are absent in *effluxa*.

DISTRIBUTION (Fig. 31). Bolivia. The type-locality is in Subtropical Moist Forest.

## MATERIAL EXAMINED

Bolivia: holotype ♂, La Paz, Rio Songo, 750 m (*Fassl*) (BMNH).**The *albella*-group**

♂, ♀, 9–32 mm. Head, thorax and ground-colour of fore wing white. Third segment of labial palpus half to same length as second. Thorax without crest of scales. Fore wing elongate, subrectangular or suboval; veins free, or  $CuA_1$  and  $CuA_2$ , or  $R_4$  and  $R_5$ , or both, stalked; plain white above except for *melanostriga* and *parvifusca*; white below, tinged with golden-yellow, and/or fuscous along apex and termen. Hind wing white, golden-yellow or tinged with yellow. Abdomen golden-ochreous, tinged with golden-yellow or white above, white below; coremata located in pockets.

GENITALIA ♂. Digitate processes of juxta often reaching anterior margin of gnathos apex.

REMARKS. The species of this group can easily be recognized by the white ground-colour of the fore wings. *T. parvifusca* is the only fuscous species in this group but is easily separated from other fuscous species by the stalked  $R_4$  and  $R_5$  of the fore wing.

*Timocratica grandis* (Perty)

(Figs 32, 69, 104, 105, 160)

*Yponomeuta grandis* Perty, [1833]: 163, pl. 32, fig. [12] [legend of figure transposed with *Pyralis bahiensis* Perty]. Holotype [♂ ?], BRAZIL: Piaui (*Spix & Martius*) (lost).*Cryptolechia grandis* (Perty) Zeller, 1854: 378 [transcription]; Felder & Rogenhofer, 1875: pl. 139, fig. 56 [adult]; Zeller, 1877: 260 [list].[*Cryptolechia bahiensis* (Perty); Walker, 1864: 712 [catalogue; name quoted from figure legend in Perty, [1833]: pl. 32, fig. 12].]*Stenoma grandis* (Perty) Walsingham, 1913: 185 [catalogue].*Timocratica grandis* (Perty) Busck, 1935: 16 [catalogue].

♂ 22–26 mm. Frons yellowish-fuscous. Second segment of labial palpus dark fuscous, outer half above and internally white, with yellowish-fuscous scales below; third segment white, progressively dark grey internally towards apex. Antenna with scape and base of flagellum white, progressively fuscous to apex. Legs golden-ochreous, fore tibia and tarsus greyish-fuscous above. Fore wing with apex, termen and tornus evenly rounded; all veins free; underside golden-yellow, slightly tinged with fuscous along apex. Hind wing golden-yellow. Abdomen golden-ochreous, first tergite and all sternites white.

♀ 28–30 mm. Fore wing broader than in male. Hind wing deep golden-yellow.

GENITALIA ♂ (Figs 104, 105). Uncus slightly narrowed at base, apex strongly concave. Apex of gnathos pointed. Digitate processes of juxta very long, reaching middle of gnathos, distal half of dorsal side with sparse setae. Margins of valva nearly parallel. Aedeagus bent ventrad; vesica with cornutus undeveloped, represented as a sclerotized area, and with many small acutely pointed spines.

GENITALIA ♀ (Fig. 160). Margin of ostium bursae expanded posteriorly, slightly concave at middle. Antrum cylindrical. Ductus bursae straight, nearly cylindrical, posterior quarter sclerotized, with few longitudinal wrinkles. Corpus bursae oblong, walls, as in ductus bursae, densely scobinated. Signum an elongate plate constricted at middle, concave at both extremities.

REMARKS. *T. grandis* has golden-yellow hind wings and is thus very similar to *bicornuta*, *constrictivalva* and *xanthotarsa*. However, it can be easily distinguished from *bicornuta* by its fuscous fore tibiae, and from the other two species by its fuscous fore tarsi.

One female from French Guiana has veins  $CuA_1$  and  $CuA_2$  of the fore wing stalked.

In pl. 32 of Perty's work two species of Stenominae are illustrated. Fig. 12 represents a large species with white fore wings and yellow hind wings, named *Pyralis bahiensis*; fig. 13 represents a smaller species with pale wings and black markings on the fore wings, named *Yponomeuta grandis*. However, as may easily be recognized from the descriptions, there is no doubt that the legends were transposed and the large white species represents *grandis*, while the smaller represents *bahiensis*. With the exception of Walker (1864), all subsequent authors (Zeller, 1854, 1877, Felder & Rogenhofer, 1875, Walsingham, 1913 and Busck, 1935), recognized fig. 12 as representing *grandis*.

In the BMNH and NMNH there were series totalling 25 specimens with white fore wings and golden-yellow hind wings; these were identified as *grandis* and agreed with Perty's fig. 12. Upon closer examination it was found that they represent four distinct species. In the absence of other evidence it seems reasonable to apply the name *grandis* to the only species with golden-yellow hind wings of this complex known to occur in the Amazon Basin of Brazil (type-locality of *grandis*). According to Horn & Kahle (1936: 206), Perty's types were deposited in the ZSBS. Dr Dierl informed me (pers. comm.) that the types cannot be found in that Museum and are believed to have been destroyed during World War II.

DISTRIBUTION (Fig. 32). Brazil (Amazon Basin), French Guiana, Panama. Despite its wide distribution, this species appears to be restricted to a single Life Zone, Tropical Moist Forest. It is interesting that the other species with the hind wings and abdomen golden-ochreous, except for *bicornuta*, were also collected in this Life Zone.

#### MATERIAL EXAMINED

11 ♂, 6 ♀ (3 ♂, 1 ♀ genitalia preparations).

**Brazil:** 1 ♂, Amazonas, São Paulo de Olivença (*Staudinger*) (MNHU); 1 ♂, Pará, Belém ('Pará') ([*Bates*]) (BMNH); 1 ♂, 3 ♀, Pará, Belém ('Pará') (*Moss*) (BMNH). **French Guiana:** 1 ♂, Guyanne, Cayenne (*Felder*) (BMNH); 2 ♂, 1 ♀, Guyanne, Cayenne (*Deyrolle*) (BMNH); 1 ♂, Guyanne, Cayenne (BMNH); 2 ♂, Guyanne, St Jean, R. Maroni (*Le Moulit*) (BMNH); 2 ♀, Guyanne, R. Maroni (*Bar*) (BMNH). **Panama:** 2 ♂, Canal Zone, Barro Colorado Island, 10–17.v.1964 (*Duckworth*) (NMNH).

### *Timocratica bicornuta* sp. n.

(Figs 32, 110, 111, 161)

♂ ♀ 18–20 mm. Frons white, edged with fuscous. Second segment of labial palpus with proximal half tinged with ochreous below, distal half fuscous, dark fuscous above, except near articulations; third segment white, dark grey internally. Antenna white; flagellum somewhat yellow towards apex. Legs golden-yellow, fore tarsus dark fuscous above. Fore wing with apex rounded or somewhat angled, all veins free; underside golden-yellow, slightly tinged with fuscous along apex and termen. Hind wing golden-yellow. Abdomen golden-yellow, first tergite and all sternites white.

GENITALIA ♂ (Figs 110, 111). Uncus with lateral margins parallel, apex concave. Apex of gnathos blunt. Digitate processes of juxta bent outwards, diverging progressively from each other towards apex, with long setae apically. Valva long, narrow, lateral margins nearly parallel. Aedeagus bent ventrad at basal third, vesica with two strong bent cornuti opposite each other.

GENITALIA ♀ (Fig. 161). Margin of ostium bursae with two small posteriorly directed lobes. Antrum very broad medially. Ductus bursae somewhat broadened towards corpus bursae. Corpus bursae nearly globular, walls, as in ductus bursae, densely scobinate. Signum a rectangular plate.

REMARKS. *T. bicornuta* is easily separated from *xanthotarsa* and *constrictivalva* by its fuscous fore tarsi, and from *grandis* by its yellow fore tibiae. It is also the only species in the group with two strong cornuti in the vesica.

The only known female agrees in every detail with the males but is doubtfully associated with this species.

DISTRIBUTION (Fig. 162). Brazil (south-eastern coast), French Guiana. The holotype of this species, the only Brazilian specimen bearing detailed data, was collected in Subtropical Lower Montane Wet Forest. The female from French Guiana came from Tropical Moist Forest, like the others of the *grandis* complex. This difference in ecological adaptation may indicate that the female belongs to a different species.

#### MATERIAL EXAMINED

3 ♂, 1 ♀ (3 ♂, 1 ♀ genitalia preparations).

Holotype ♂, **Brazil**: Rio de Janeiro, Pico do Itatiaia, 28.iii–1.iv.1958 (*Kettlewell*) (BMNH).

Paratypes. **Brazil**: 2 ♂ (*Ragonot*) (BMNH).

Excluded from types-series. **French Guiana**: 1 ♀, Guyanne, St Jean, R. Maroni (*Le Moult*) (BMNH).

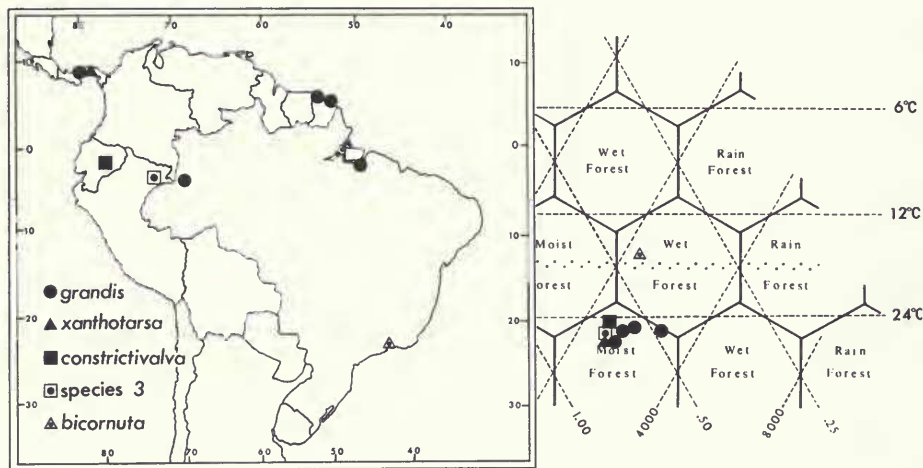


Fig. 32 Geographical and ecological distribution of the *abella*-group of *Timocratica*.

#### *Timocratica xanthotarsa* sp. n.

(Figs 32, 70, 106, 107)

♂ 21–22 mm. Frons white, edged with fuscous. Second segment of labial palpus ochreous below, basal two-thirds black above, distal third and internal side white; basal third of third segment white, apical two-thirds black. Antenna white, somewhat tinged with yellow towards apex. Legs golden-yellow above, white below. Fore wing with apex, termen and tornus evenly rounded; all veins free; underside golden-ochreous, slightly tinged with fuscous along apex. Hind wing golden-yellow. Abdomen golden-ochreous, first tergite and sternites white.

GENITALIA ♂ (Figs 106, 107). Uncus with lateral margins nearly parallel, apical margin concave. Apex of gnathos long, strongly sclerotized. Digitate processes of juxta tapered towards apex, apex pointed, dorsal side with sparse setae apically. Valva with basal third narrow, distal two-thirds wide, margins evenly rounded; apex acutely rounded. Aedeagus slightly bent ventrad, vesica with strong curved cornutus.

REMARKS. *T. xanthotarsa* is easily distinguished from *grandis* and *bicornuta* by its golden-yellow and white legs, and from *constrictivalva* by the unmodified gnathos.



DISTRIBUTION (Fig. 32). Panama. The type-series was collected in Tropical Moist Forest.

MATERIAL EXAMINED

2 ♂ (1 ♂ genitalia preparation).

Holotype ♂, **Panama**: Barro Colorado Island, 1-9.v.1964 (*Duckworth*) (NMNH).

Paratype. **Panama**: 1 ♂, Barro Colorado Island, 1-9.v.1964 (*Duckworth*) (NMNH).

*Timocratica constrictivalva* sp. n.

(Figs 32, 108, 109)

♂ 21 mm. Frons white. Antenna with scape and basal half of flagellum white. Legs golden-yellow above, white below. Fore wing with apex, termen and tornus evenly rounded; veins free; underside golden-yellow, slightly tinged with fuscous along apex. Hind wing golden-yellow. Abdomen golden-ochreous, first tergite and all sternites white.

GENITALIA ♂ (Figs 108, 109). Basal two-thirds of uncus narrow, apical third broadened, apex concave. Gnathos with two long, digitate, ventrally directed processes basally; apex triangular, dorsoventrally compressed. Digitate processes of juxta long and narrow, widely separated, with long setae at middle. Basal third of valva strongly constricted, distal two-thirds abruptly rounded. Aedeagus nearly straight, vesica with long, strong, curved cornutus and few smaller spines opposite.

REMARKS. *T. constrictivalva* is very similar externally to *xanthotarsa*, but can be easily distinguished by its constricted valvae; from *grandis* and *bicornuta* it can be separated by the absence of fuscous scales on the legs. *Timocratica* species 3 is possibly the female of this species (see below).

The only specimen representing *constrictivalva* is not in very good condition. It lacks the palpi, the right and half of the left antenna, one of each of the mid and hind legs, as well as most of the scales on the thorax and remaining legs. Nevertheless, as the genitalia are so peculiar and distinctive, it cannot be confused with any other species in the genus. It therefore seems justified to name and describe it.

DISTRIBUTION (Fig. 32). Ecuador (eastern side of the Andes). The only specimen was collected in Tropical Moist Forest.

MATERIAL EXAMINED

Holotype ♂, **Ecuador**: Pastaza, Sarayacu (*Buckley*) (BMNH).

*Timocratica* species 3

(Figs 32, 162)

♀ 18 mm. Externally very similar to *constrictivalva*. Veins  $CuA_1$  and  $CuA_2$  stalked on fore wing.

GENITALIA ♀ (Fig. 162). Margin of ostium bursae expanded posteriorly as two lobes. Antrum long, somewhat broadened at middle, with few strong longitudinal wrinkles. Ductus bursae constricted posteriorly, broadening progressively towards corpus bursae. Corpus bursae wide, globular, walls, as in ductus bursae, densely scobinated. Signum a single subrectangular plate weakly sclerotized along middle.

REMARKS. The specimen considered here is externally very similar to *constrictivalva* and *xanthotarsa*, and may well represent the female of the former species, but it differs by the stalked veins  $CuA_1$  and  $CuA_2$  of the fore wing.

DISTRIBUTION (Fig. 32). Peru (eastern side of the Andes). The single specimen was collected in Tropical Moist Forest.

MATERIAL EXAMINED

**Peru**: 1 ♀, Loreto, Iquitos (*Strecker*) (NMNH).

*Timocratica subovalis* (Meyrick)

(Figs 33, 112, 113)

*Stenoma subovalis* Meyrick, 1932: 304; Busck, 1935: 58 [catalogue]. Holotype ♂, BRAZIL (NMNH) [examined].

*Stenoma stomatocosma* Meyrick, 1932: 304. Holotype ♂, BRAZIL: (NMNH) [examined]. **Syn. n.**

*Timocratica stomatocosma* (Meyrick) Busck, 1935: 17 [catalogue].

*Timocratica subovalis* (Meyrick) Duckworth, 1962: 113.

♂ 16–17 mm. Frons white, edged with fuscous. Second segment of labial palpus golden-ochreous below, basal half dark fuscous above, white internally and at distal articulation; third segment white with fuscous scales towards apex. Antenna ochreous with fuscous scales, scape white. Fore coxa golden-yellow below, tibia and tarsus dark fuscous; mid and hind tarsi golden-yellow. Fore wing with costa evenly rounded, apex rounded, somewhat angled, termen and tornus evenly rounded; veins free; underside of both wings golden-yellow above cell. Hind wing white above. Abdomen golden-ochreous, first tergite, anal tuft and sternites white.

GENITALIA ♂ (Figs 112, 113). Uncus slightly broadened basally or with lateral margins nearly parallel; apex strongly concave, nearly bifurcate. Apex of gnathos short, pointed. Digitate processes of juxta well separated basally; distal half progressively pointed, covered with long setae dorsally. Valva wide, dorsal margin straight, ventral margin evenly rounded. Aedeagus bent ventrad, vesica with long, strong, bent cornutus and many smaller, pointed spines opposite.

REMARKS. *T. subovalis* is the only species with a golden-ochreous abdomen and white hind wings that has the mid and hind tarsi golden-yellow.

The holotype of *stomatocosma* is an anomalous specimen in which  $M_3$  and  $CuA_1$  are shortly stalked in the right fore wing and stalked from the middle in the left. Meyrick considered it a distinct species, probably because of this feature; since both holotypes agree in all other details, including genitalia, they are considered here to be conspecific.

DISTRIBUTION (Fig. 33). Brazil (Amazon Basin). The two type-localities belong to the same Life Zone, Tropical Moist Forest.

#### MATERIAL EXAMINED

**Brazil:** holotype ♂ of *S. subovalis*, Amazonas, Ponte Nova, Rio Xingu (NMNH); holotype ♂ of *S. stomatocosma*, Tefé, ix (*Fassal*) (NMNH).

#### *Timocratica* species 4

(Figs 33, 177)

♀ 17 mm. Head white. Second segment of labial palpus white, basal half dark fuscous above; third segment white, progressively fuscous towards apex. Legs white; fore coxa and femur golden-yellow above, tibia and tarsus dark fuscous below; mid and hind tarsus golden-yellow below. Fore wing with costa evenly rounded, apex angled, termen and tornus obliquely rounded;  $R_4$  and  $R_5$  connate basally,  $CuA_1$  and  $CuA_2$  stalked at basal fourth; underside golden-yellow, slightly tinged with fuscous along apex. Hind wing slightly tinged with golden-yellow above, deeper towards apex, underside golden-yellow above cell and along termen. Abdomen golden-ochreous, first tergite, anal tuft and sternites white.

GENITALIA ♀ (Fig. 177). Margin of ostium bursae slightly concave at middle. Antrum straight, nearly cylindrical. Ductus bursae nearly cylindrical, posterior third thickened, wrinkled, strongly scobinate; anterior two-thirds wrinkled longitudinally. Corpus bursae globular. Signum an irregular, strongly concave plate.

REMARKS. The specimen described here is the only one that combines an ochreous abdomen and golden-yellow hind wings with fore tarsi which are white above.

DISTRIBUTION (Fig. 33). Brazil (Amazon Basin): in Tropical Moist Forest.

#### MATERIAL EXAMINED

**Brazil:** 1 ♀, Pará, Belém ('Pará') (*Moss*) (BMNH).

#### *Timocratica amseli* Duckworth sp. rev.

(Figs 33, 116, 117, 179)

*Timocratica? albella* Amsel, 1956: 306, pl. 63, fig. 6, pl. 107, fig. 8. Holotype ♂, VENEZUELA (ZSBS) [examined]. [Junior secondary homonym of *Depressaria (Volucra) albella* Zeller, 1839.]

*Timocratica amseli* Duckworth, 1962: 113. [Objective replacement name for *Timocratica? albella* Amsel, 1956.]

[*Timocratica xanthosoma* (Dognin); Duckworth, 1966: 197 (partim). Misidentification.]

♂ 13 mm, ♀ 17 mm. Head white. Basal two-thirds of labial palpus ochreous externally, basal half dark fuscous above, distal third and internally white; third segment white basally, progressively fuscous towards apex. Fore coxa golden-yellow below, femur and basal two-thirds of tibia golden-ochreous above, distal third of tibia and tarsus dark fuscous; mid tarsus tinged with ochreous below. Fore wing with basal third of costa gently arched, distal two-thirds nearly straight; apex rounded, somewhat angled; termen and tornus obliquely rounded; veins free; basal third of costa tinged with golden-yellow below. Hind wing white. Abdomen golden-ochreous above, first tergite and sternites white.

GENITALIA ♂ (Figs 116, 117). Uncus somewhat broadened at middle. Apex of gnathos narrow, nearly pointed. Digitate processes of juxta very long, compressed laterally at base, distal half with several long setae dorsally. Margins of valva parallel, evenly rounded. Aedeagus strongly bent ventrad at basal third, vesica with strong cornutus.

GENITALIA ♀ (Fig. 179). Margin of ostium bursae slightly concave at middle. Antrum wide, anterior half narrowing progressively towards ductus bursae, strongly wrinkled. Ductus bursae widening progressively towards corpus bursae. Corpus bursae pear-shaped. Signum an irregular, sclerotized plate, concave across middle.

REMARKS. *T. amseli* is easily distinguished from *xanthosoma* by its white fore wing costa, and from *fuscipalpis* by the ochreous tinge on the second segment of the labial palpus (almost dark fuscous in *fuscipalpis*).

Duckworth (1966: 197) synonymized this species with *xanthosoma*, but my examination of the types of both species has shown them to be distinct; this is supported by their different ecological distribution.

DISTRIBUTION (Fig. 33). Northern Venezuela, in Tropical Dry Forest.

MATERIAL EXAMINED

1 ♂, 1 ♀ (1 ♂, 1 ♀ genitalia preparation).

Venezuela: holotype ♂, Distrito Federal, Caracas, Los Venados, vi-viii. 1937 (*Vogl*) (ZSBS); 1 ♀ paratype; Distrito Federal, Caracas, Berg Avila, 1000 m, vi-vii (*Vogl*) (ZSBS).

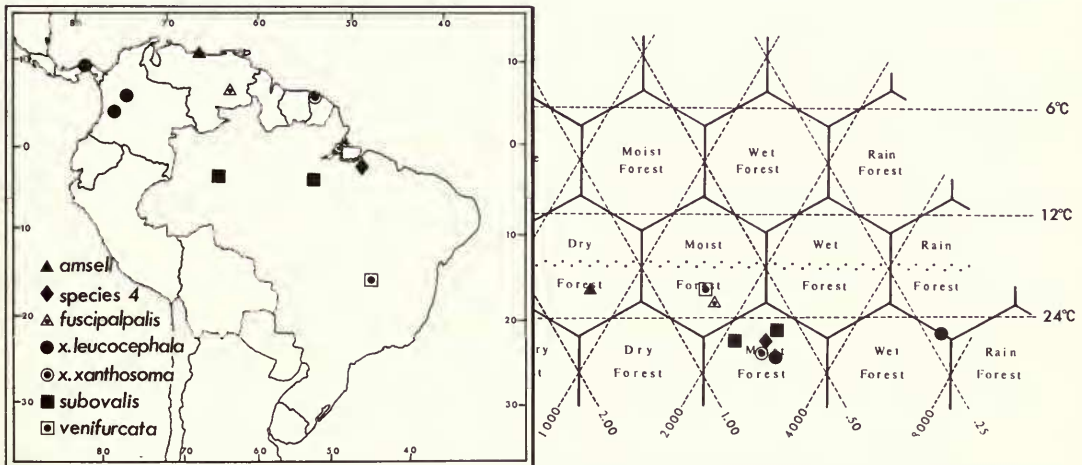


Fig. 33 Geographical and ecological distribution of the *albella*-group of *Timocratica*.

*Timocratica venifurcata* sp. n.

(Figs 21, 33, 78, 120, 121)

♂ 16–17 mm. Head white. Second segment of labial palpus white, basal two-thirds dark grey externally; third segment white, with grey scales near apex. Legs white, distal half of fore tibia, and tarsi dark fuscous below. Fore wing with costa gently arched, apex rounded, termen and tornus obliquely rounded;  $R_4$  and  $R_5$ , and  $CuA_1$  and  $CuA_2$ , stalked; basal half of costa with fuscous and golden-yellow scales below. Hind wing white. Abdomen golden-ochreous, first tergite, anal tuft and sternites white.

GENITALIA ♂ (Figs 120, 121). Uncus wide, lateral margins nearly parallel, apex bifurcate. Apex of gnathos narrow, pointed. Digitate processes of juxta flat, triangular, distal half with long sparse setae. Valva with basal half wide, narrowing progressively towards apex. Aedeagus bent ventrad, vesica with strong, short cornutus and many smaller spines opposite.

REMARKS. *T. venifurcata* is the only white species which has an ochreous abdomen and  $R_4$  and  $R_5$  stalked on the fore wings (Fig. 21). It can be easily distinguished from all others with an ochreous abdomen by the lack of ochreous coloration on its palpi and legs.

DISTRIBUTION (Fig. 33). Brazil (Central Plateau), in Tropical Premontane Moist Forest.

MATERIAL EXAMINED

2 ♂ (1 ♂ genitalia preparation).

Holotype ♂, **Brazil**: Distrito Federal, Planaltina, 1000 m, 9.xi.1977 (*Becker*) (MN).

Paratype. **Brazil**: 1 ♂, Distrito Federal, Planaltina, 1000 m, 11.xi.1976 (*Becker*) (BMNH).

*Timocratica fuscipalpalis* sp. n.

(Figs 33, 114, 115)

♂ 12 mm. Frons white, edged with fuscous. Second segment of labial palpus dark fuscous, tinged with ochreous basally below, white internally and at distal articulation; third segment white, fuscous internally. Antenna light ochreous, scape white. Fore coxa tinged with golden-yellow below; mid and hind legs white. Fore wing with basal third of costa gently arched, apex rounded, termen straight, tornus rounded; veins free; costa golden-yellow below. Hind wing white. Abdomen golden-ochreous above, first tergite and sternites white.

GENITALIA ♂ (Figs 114, 115). Lateral margins of uncus nearly parallel, apex strongly concave, nearly bifurcate. Apex of gnathos broad, rounded. Digitate processes of juxta very long, external margins nearly straight, distal half of internal margins sinuate, distal two-thirds with sparse, irregular row of setae. Dorsal margin of valva straight, ventral margin with basal third sinuate, middle third parallel to dorsal margin, distal third converging progressively towards apex; apex acute. Aedeagus bent ventrad, vesica with single, strong, bent cornutus.

REMARKS. *T. fuscipalpalis* is very close to *amseli* but is easily distinguished by the almost dark fuscous second segment of the labial palpi. It can also easily be distinguished from *venifurcata* by the free veins on the fore wing, from *subovalis* by the plain white hind wings, and from *xanthosoma* by the white costa.

DISTRIBUTION (Fig. 33). Southern Venezuela, in Tropical Premontane Moist Forest, a Life Zone not shared by its closest relatives, *amseli* and *xanthosoma*.

MATERIAL EXAMINED

Holotype ♂, **Venezuela**: Bolivar, Guayaraca, Auyan Tepui, 1100 m, 14.iv.1956 (*Fernandez & Rosales*) (NMNH).

*Timocratica xanthosoma* (Dognin)

*Stenoma xanthosoma* Dognin, 1913: 416.

*Timocratica xanthosoma* (Dognin) Duckworth, 1966: 197 (partim) [synonymy].

♂ 10–17 mm, ♀ 13–18 mm. Frons white, edged with golden-yellow; vertex golden-yellow or white. Second segment of labial palpus white, basal third dark grey above; third segment white with dark grey scales. Antenna white with dark fuscous scales. Legs white; fore coxa golden-yellow below; fore tibia, fore and mid tarsi dark fuscous with white scales. Fore wing with base of costa arched, distal two-thirds nearly straight, apex rounded, termen and tornus obliquely rounded; veins free or  $CuA_1$  and  $CuA_2$  stalked; basal third of costa dark fuscous or black; white below. Hind wing white. Abdomen golden-ochreous, first tergite and sternites white.

GENITALIA ♂ (Figs 118, 119). Uncus narrow, lateral margins nearly parallel, apex concave. Apex of gnathos long, narrow. Digitate processes of juxta with lateral margins nearly parallel, apex with few short setae dorsally. Valva narrow, somewhat broadened basally or with margins nearly parallel. Aedeagus slightly bent ventrad, ventral side of apex with two lateral, pointed projections; vesica with single, long, curved cornutus.

GENITALIA ♀ (Fig. 176). Margin of ostium bursae expanded posteriorly, strongly concave at middle. Antrum wide, wrinkled anteriorly. Ductus bursae cylindrical, expanded progressively towards corpus bursae. Corpus bursae reniform. Signum a transverse, irregular plate, slightly constricted at middle.

REMARKS. *T. xanthosoma* can be easily distinguished from other species with an ochreous abdomen and white hind wings by the dark fuscous or black basal half of its fore wing costa, and from *venifurcata* by the free veins  $R_4$  and  $R_5$ .

Duckworth (1966: 197) synonymized *amseli* with *xanthosoma* and added Guatemala, Panama and Colombia to the distribution. After examining his material it was found that *amseli* is a good species and the specimens from Panama represented a subspecies of *xanthosoma*, described below as *leucocephala*. The material from Guatemala was not available for study.

DISTRIBUTION (Fig. 33). Colombia, French Guiana, Panama. Both subspecies appear to be restricted to Tropical Moist Forest and Tropical Wet Forest.

### *Timocratica xanthosoma xanthosoma* (Dognin)

(Figs 33, 176)

*Stenoma xanthosoma* Dognin, 1913: 416; Meyrick, 1925: 192 [synonymy]; Busck, 1935: 60 [catalogue].

Holotype ♂, FRENCH GUIANA (NMNH) [examined].

*Stenoma sacra* Meyrick, 1918: 209. Holotype ♀, FRENCH GUIANA (BMNH) [examined]. [Synonymized by Meyrick, 1925: 192.]

*Timocratica xanthosoma* (Dognin) Clarke, 1955: 392, pl. 196, figs 3–3c [adult, genitalia of holotype of *sacra* Meyrick].

♂ 10–14 mm, ♀ 13–16 mm. Vertex golden yellow.

REMARKS. *T. xanthosoma xanthosoma* has the vertex golden-yellow, whereas in *x. leucocephala* it is white. The nominate subspecies is also smaller on average than the latter, and the white scales on the palpi, tarsi and antennae predominate over the black, making these appendages look lighter.

DISTRIBUTION (Fig. 33). French Guiana.

#### MATERIAL STUDIED

5 ♂, 2 ♀ (4 ♂, 2 ♀ genitalia preparations).

**French Guiana:** holotype ♂ of *S. xanthosoma*, St Laurent du Maroni (NMNH); holotype ♀ of *S. sacra*, R. Maroni, 1916 (*Le Moulit*) (BMNH); 4 ♂, 1 ♀, St Jean du Maroni (*Le Moulit*) (BMNH).

### *Timocratica xanthosoma leucocephala* subsp. n.

(Figs 33, 77, 118, 119)

*Timocratica xanthosoma* (Dognin); Duckworth, 1966: 197 (partim) [synonymy].

♂ 14–17 mm, ♀ 18 mm. Vertex white. Antenna white mixed with black scales. Fore femur, fore and mid tibiae above, and tarsi black, with scattered white scales mainly on the mid and hind tarsi.

REMARKS. *T. xanthosoma leucocephala* is distinguished from the nominate subspecies by the white vertex. It is also larger on average and the black scales on the palpi, antennae and tarsi predominate over the white so that these appendages look darker.

DISTRIBUTION (Fig. 33). Colombia and Panama.

#### MATERIAL EXAMINED

6 ♂, 1 ♀ (3 ♂, 1 ♀ genitalia preparations).

Holotype ♂, **Panama:** Canal Zone, Barro Colorado Island, 5–10.iv.1965 (*Duckworth*) (NMNH).

Paratypes. **Colombia:** 1 ♂ [Bogota?] (*Nolcken*) (BMNH); 1 ♂, Chocó, Juntas, Rio San Juan, 100 m ('400 ft'), ii.1909 (*Palmer*) (BMNH). **Panama:** 3 ♂, 1 ♀, Canal Zone, Barro Colorado Island, 10–28.iv.1964, 5–10.iv.1965 (*Duckworth*) (NMNH).

*Timocratica anelaea* (Meyrick)

(Figs 34, 71, 122, 123)

*Stenoma anelaea* Meyrick, 1932: 305. Holotype ♂, BRAZIL (NMNH) [examined].  
*Timocratica anelaea* (Meyrick) Busck, 1935: 16 [catalogue].

♂ 25–26 mm. Frons white, edged with golden-yellow. Second segment of labial palpus ochreous, basal half dark grey above; third segment black. Antenna white. Fore coxa and tibia with dark grey scales above, fore and mid tarsi black. Fore wing elongate, costa gently arched, apex angled, termen and tornus obliquely rounded; veins free; white below. Hind wing white. Abdomen golden-ochreous with white transverse bands on articulations, first tergite, anal tuft and sternites white.

GENITALIA ♂ (Figs 122, 123). Uncus with lateral margins nearly parallel, apex strongly concave. Apex of gnathos broad, triangular. Digitate processes of juxta long, broad basally, narrowing progressively towards apex; apex pointed, distal half with long setae above, few setae on ventral side. Margins of valva evenly rounded, nearly parallel, somewhat convergent from distal third to apex. Aedeagus bent ventrad at base, vesica with strong elongate, bent cornutus and many minute spines.

REMARKS. *T. anelaea* is the only species in the group with an ochreous abdomen transversely banded with white on the articulations.

DISTRIBUTION (Fig. 34). Brazil (Amazon Basin). Both localities are in Tropical Moist Forest.

## MATERIAL EXAMINED

3 ♂ (2 ♂ genitalia preparation).

**Brazil:** holotype ♂, Amazonas, Ponte Nova, Rio Xingu (NMNH); 2 ♂, Pará, Belém ('Pará') (Moss) (BMNH).

*Timocratica titanoleuca* sp. n.

(Figs 34, 73, 124, 125)

♂ 27–28 mm. Frons white, edged with fuscous. Second segment of labial palpus dark fuscous below and externally, white internally and near distal articulation; third segment white basally, dark fuscous towards apex. Antenna white. Fore coxa above, mid and hind tarsi golden-ochreous; fore tibia and tarsus white above, dark fuscous below. Wings below golden-ochreous above cell and on veins, fore wing with costa gently arched; apex angled, somewhat pointed; termen straight, oblique; tornus rounded; veins free. Abdomen white, somewhat tinged with cream above.

GENITALIA ♂ (Figs 124, 125). Uncus with lateral margins nearly parallel, basal third slightly broadened, apex strongly concave. Apex of gnathos narrow, pointed, strongly sclerotized. Digitate processes of juxta broadened basally, narrowing progressively towards apex, distal half with row of long setae dorsally. Ventral margin of valva evenly rounded, dorsal margin nearly straight. Aedeagus slightly bent ventrad at middle, vesica with strong bent cornutus and many spines of different sizes opposite.

REMARKS. *T. titanoleuca* is very similar externally to *macroleuca* and *leucorectis*, but can be easily distinguished by the absence of ochreous colouring on the labial palpi.

DISTRIBUTION (Fig. 34). Peru (eastern side of Andes). Both localities are in Tropical Premontane Wet Forest.

## MATERIAL EXAMINED

2 ♂ (2 ♂ genitalia preparations).

Holotype ♂, **Peru:** Puno, La Oroya, R. Inambari, Carabaya, 1000 m ('3100 ft'), ix.1905 (*Ockenden*) (BMNH).

Paratype. **Peru:** 1 ♂, Huánuco, Tingo Maria, 2.xi.1949 (*Allard*) (NMNH).

*Timocratica macroleuca* (Meyrick)

(Figs 34, 72, 130, 131)

*Stenoma macroleuca* Meyrick, 1932: 304. Holotype ♂, BOLIVIA (NMNH) [examined].  
*Timocratica macroleuca* (Meyrick) Busck, 1935: 17 [catalogue].

♂ 27–30 mm. Frons white, edged with fuscous. Second segment of labial palpus white, basal half ochreous below, dark grey above; third segment white, with few black scales on apex. Antenna white. Fore coxa and tibia ochreous above; fore tarsus white above, dark fuscous below; mid and hind tarsi golden-ochreous. Fore wing with costa gently arched; apex angled, somewhat pointed; termen straight, oblique; tornus rounded; veins free; underside golden-yellow, deep golden-yellow along costa and veins. Hind wing below golden-yellow along costa and on veins. Abdomen tinged with golden-yellow above, becoming progressively white towards base, white below.

GENITALIA ♂ (Figs 130, 131). Uncus with lateral margins nearly parallel, somewhat broadened at basal two-thirds, apex concave. Apex of gnathos short, strongly sclerotized, rounded. Digitate processes of juxta very long, narrow, distal two-thirds with sparse setae. Margins of valva evenly rounded, nearly parallel. Aedeagus nearly straight, vesica with strong bent cornutus and many spines of different sizes.

REMARKS. *T. macroleuca* is very similar externally to *leucorectis* and *titanoleuca*, but can be easily distinguished from *titanoleuca* by the ochreous tinge of the second segment of its labial palpi and from *leucorectis* by the fore tarsi, which are white above.

DISTRIBUTION (Fig. 34). Bolivia (eastern slopes of the Andes). The type-locality is in Subtropical Moist Forest, transitional to Tropical Premontane Moist Forest.

#### MATERIAL EXAMINED

2 ♂ (2 ♂ genitalia preparation).

**Bolivia:** holotype ♂, La Paz, Rio Songo (*Fassl*) (NMNH); 1 ♂, La Paz, Rio Songo, 750 m (*Fassl*) (BMNH).

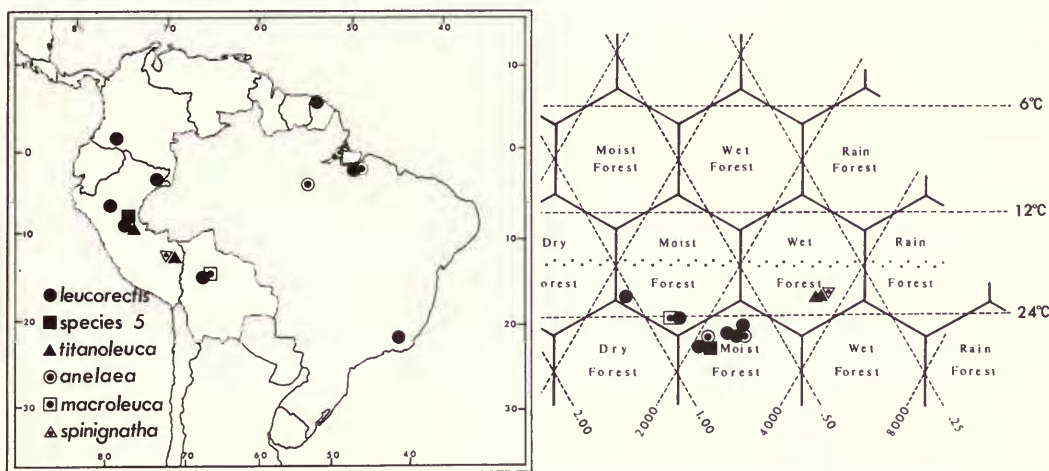


Fig. 34 Geographical and ecological distribution of the *albella*-group of *Timocratica*.

### *Timocratica leucorectis* (Meyrick)

(Figs 34, 126, 127, 164)

*Stenoma leucorectis* Meyrick, 1925: 223. Lectotype ♂, BRAZIL (BMNH), designated by Clarke (1955: 388) [examined].

*Timocratica leucorectis* (Meyrick) Busck, 1935: 17 [catalogue]; Clarke, 1955: 388, pl. 194, figs 4, 4b [adult, genitalia].

♂ 28–30 mm, ♀ 30–32 mm. Frons white, edged with fuscous in some specimens. Second segment of labial palpus ochreous below, basal half dark grey above, distal half white above and internally; third segment progressively black from basal third to apex. Antenna white. Distal half of fore tibia above, and fore tarsus dark fuscous, mid and hind tarsi golden-yellow. Fore wing with costa gently arched, apex angled, somewhat pointed; termen straight, oblique; tornus rounded; veins free; underside of wings above cell golden-yellow, some specimens tinged with fuscous along apex and termen. Abdomen white.

GENITALIA ♂ (Figs 126, 127). Uncus with lateral margins nearly parallel, slightly constricted at basal third, apex strongly concave. Gnathos very long, lateral arms nearly parallel from basal third towards apex, two

digitate posteriorly directed processes at basal third; apex rounded, strongly sclerotized. Digitate processes of juxta very long; distal half somewhat bent outwards, with long setae. Margins of valva nearly parallel, distal half of ventral margin evenly rounded. Aedeagus curved ventrad, vesica with strong cornutus and several spines.

**GENITALIA ♀** (Fig. 164). Lamella antevaginalis as two broad, triangular lobes. Ostium bursae wide, margin nearly straight. Antrum bent at middle, anterior half with a few longitudinal wrinkles. Ductus bursae twisted posteriorly, wrinkled longitudinally. Corpus bursae nearly globular, walls, as in ductus bursae, densely scobinate. Signum a nearly circular, diffuse plate.

**REMARKS.** *T. leucorectis* is one of the largest species in the group, and very similar externally to *titanoleuca* and *macroleuca*. It can be easily distinguished from the former by the ochreous underside of the labial palpi and from the latter by the fuscous fore tarsi. The base of the gnathos arms is modified as in *spinignatha* and *constrictivalva* but in *leucorectis* the digitate processes are directed posteriorly.

**DISTRIBUTION** (Fig. 34). Brazil, Bolivia, Colombia, French Guiana and Peru. Despite its wide geographic distribution this species appears to be confined to only two Life Zones, Subtropical Moist Forest and Tropical Moist Forest.

**MATERIAL EXAMINED**

7 ♂, 2 ♀ (4 ♂, 1 ♀ genitalia preparations).

**Bolivia:** 2 ♂, La Paz, Rio Songo (*Fassl*) (BMNH). **Brazil:** lectotype ♂, Minas Gerais, Leopoldina, 1924 (BMNH); 1 ♂ paralectotype, Pará, Belém ('Pará'), vii.1919 (*Parish*) (NMNH). **Colombia:** 1 ♂, Putumayo, Mocoa (*Hopp*) (MNHU). **French Guiana:** 1 ♂, Guyanne, Maroni River, 60 m, viii.1904 (*Schaus*) (NMNH). **Peru:** 1 ♂, San Martín, Moyobamba (*de Mathan*) (BMNH); 1 ♀, Loreto, Pebas (*de Mathan*) (BMNH); 1 ♀, San Martín, Huállaga, Chambirayacu (*de Mathan*) (BMNH).

*Timocratica spinignatha* sp. n.

(Figs 34, 128, 129)

♂ 19–23 mm. Frons white, edged with fuscous. Second segment of labial palpus ochreous below, dark fuscous above except distal quarter, distal quarter white above; third segment white, apical third dark fuscous. Fore coxa golden-yellow, femora ochreous, basal half dark fuscous above; tarsus and distal half of tibia dark fuscous; mid femur and tibia tinged externally with golden-ochreous, mid and hind tarsi golden-ochreous. Fore wing with costa gently arched, apex angled, termen and tornus rounded; veins free; underside golden-ochreous above cell and on veins, tinged with fuscous along apex and termen. Hind wing golden-ochreous below above cell and on veins. Abdomen tinged with cream above, white below.

**GENITALIA ♂** (Figs 128, 129). Uncus constricted at middle, apex bifurcate. Gnathos arms expanded ventrad at base, densely covered with minute spines, apex short, rounded. Digitate processes of juxta long, slender, lateral margins nearly parallel, with sparse long setae, mainly along dorsal side. Valva with dorsal margin straight except at base, ventral margin evenly rounded. Aedeagus bent ventrad at basal third, vesica with bent cornutus and many spines of different sizes.

**REMARKS.** *T. spinignatha* is similar externally to *leucorectis*, *macroleuca* and *titanoleuca* but is smaller. It differs externally from *macroleuca* and *titanoleuca* by the dark fuscous fore tarsi and from *leucorectis* by the dark fuscous tinge on the fore femora. The modified gnathos makes the male genitalia very distinctive.

**DISTRIBUTION** (Fig. 34). Peru. The type-series was collected in Tropical Premontane Wet Forest.

**MATERIAL EXAMINED**

4 ♂ (2 ♂ genitalia preparations).

Holotype ♂, **Peru:** Puno, La Oroya, R. Inambari, 1000 m ('3100 ft'), iii.1905 (*Ockenden*) (BMNH).

Paratypes. **Peru:** 3 ♂, Puno, La Oroya, R. Inambari, 1000 m ('3100 ft'), iii.1905 (*Ockenden*) (BMNH).

*Timocratica* species 5

(Figs 34, 163)

♀ 17 mm. Frons white, edged with fuscous. Second segment of labial palpus golden-yellow, basal half tinged with dark fuscous above; third segment fuscous internally, white externally. Fore femur golden-yellow;



basal half of fore tibia ochreous above, distal half, and tarsus dark fuscous; mid leg and hind tarsus tinged with golden-yellow. Fore wing with costa evenly arched; apex, termen and tornus rounded; veins free; underside golden-yellow above cell, tinged with fuscous along apex and termen. Hind wing white, underside golden-yellow above cell. Abdomen white.

**GENITALIA** ♀ (Fig. 163). Lamella antevaginalis expanded posteriorly as two lobes. Antrum very broad posteriorly, anterior half funnel-shaped, wrinkled longitudinally. Ductus bursae broadening progressively towards corpus bursae. Corpus bursae pear-shaped. Signum an irregular plate, strongly constricted at middle.

**REMARKS.** This species is very similar externally to *spinignatha*, but is smaller and lacks the fuscous tinge on the fore femora.

**DISTRIBUTION** (Fig. 34). Peru (eastern side of the Andes), in Tropical Moist Forest.

**MATERIAL EXAMINED**

**Peru:** 1 ♀, San Martín, Tarapoto (*de Mathan*) (BMNH).

*Timocratica argonais* (Meyrick)

(Figs 35, 132, 133, 170)

*Stenoma argonais* Meyrick, 1925: 224. Holotype ♀, BRAZIL (BMNH) [examined].

[*Stenoma maturescens* Meyrick, 1925: 223 (partim). Misidentification.]

*Timocratica argonais* (Meyrick) Busck, 1935: 16 [catalogue].

*Timocratica argonias*: Clarke, 1955: 387, pl. 193, figs 1-1c. [Incorrect subsequent spelling.]

♂ 20-23 mm, ♀ 20-25 mm. Head white, frons edged with fuscous. Second segment of labial palpus ochreous below, basal two-thirds dark grey above, distal third above and internally white; distal half of third segment progressively fuscous towards apex. Fore coxa and femur above, and tarsus dark fuscous; mid coxa and femur tinged with golden-ochreous externally, tarsus ochreous; hind tibia tinged with golden-yellow externally, tarsus golden-yellow. Fore wing with costa gently arched, apex rounded, somewhat angled; termen and tornus obliquely rounded; veins free; golden-ochreous below, slightly tinged with fuscous along apex and termen. Hind wing golden-yellow above cell. Abdomen white.

**GENITALIA** ♂ (Figs 132, 133). Uncus with lateral margins nearly parallel, apex strongly concave. Apex of gnathos long and narrow. Digitate processes of juxta broadened basally, narrowing progressively towards apex, distal half with sparse setae above. Ventral margin of valva evenly rounded, dorsal margin straight except at base. Aedeagus somewhat curved ventrad, vesica with strong, curved cornutus and many acutely pointed spines of different sizes.

**GENITALIA** ♀ (Fig. 170). Margin of ostium bursae straight. Antrum long with some longitudinal wrinkles, strongly bent at connection with ductus bursae. Ductus bursae broadening progressively towards corpus bursae, walls slightly wrinkled. Corpus bursae oblong, walls plain and smooth. Signum an elongate plate weakly sclerotized and smooth along middle.

**REMARKS.** *T. argonais* is very similar externally to *maturescens*, *megaleuca* and *palpalis*. However, it can be easily distinguished externally from the first by the white inner surface of the labial palpus, and from the others by the fuscous tinge along the apex and termen on the underside of the fore wing. The large series from French Guiana and Guyana agrees well with the lectotype of *argonais* but their conspecificity should be confirmed by males from the type-locality.

**DISTRIBUTION** (Fig. 35). Brazil, French Guiana and Guyana. All the known localities of this species are in Tropical Moist Forest.

**MATERIAL EXAMINED**

37 ♂, 15 ♀ (2 ♂, 4 ♀ genitalia preparations).

**Brazil:** holotype ♀, Amazonas, Fonte Boa, ii.1920 (*Parish*) (BMNH); 1 ♀, Amazonas, Fonte Boa, vii.1906 (*Klages*) (BMNH). **French Guiana:** 6 ♂, 1 ♀ (paralectotypes of *S. maturescens*), R. Maroni (*Le Moul*) (BMNH; NMNH); 29 ♂, 10 ♀, Nouveaux Chantier, i-x (*Le Moul*) (BMNH); 1 ♂, St Jean du Maroni (*Le Moul*) (BMNH). **Guyana:** 1 ♀, Berbice, New River, 250 m ('750 ft'), 20.i-23.iii.1938 (*Hudson*) (BMNH).

*Timocratica maturescens* (Meyrick)

(Figs 35, 134, 135)

*Stenoma maturescens* Meyrick, 1925: 223. Lectotype ♂, FRENCH GUIANA (BMNH), designated by Clarke (1955: 391) [examined].

*Timocratica maturescens* (Meyrick) Busck, 1935: 17 [catalogue]; Clarke, 1955: 391, pl. 195, figs 1–1b [adult, genitalia].

♂ ♀ 20–22 mm. Head white, frons edged with fuscous. Second segment of labial palpus ochreous, basal third tinged with dark grey above; third segment white with some fuscous scales on apex. Fore coxa and femur above, and tarsus dark fuscous; fore coxa and femur below, and mid and hind tarsi ochreous. Fore wing with costa gently arched, apex angled, termen and tornus rounded; veins free; underside ochreous above cell, white or tinged with fuscous along apex and termen. Hind wing underside ochreous above cell. Abdomen white.

GENITALIA ♂ (Figs 134, 135). Uncus with lateral margins nearly parallel, slightly broader basally, apex strongly concave. Apex of gnathos broad, rounded. Digitate processes of juxta long, lateral margins nearly parallel, with sparse long setae mainly along dorsal distal two-thirds. Ventral margin of valva evenly rounded, dorsal margin nearly straight. Aedeagus nearly straight, vesica with strong, curved cornutus and many acutely pointed spines of different sizes.

REMARKS. *T. maturescens* is very similar externally to *argonais* and *palpalis* but can be easily distinguished by the lack of white on the second segment of the labial palpus. Meyrick described this species from a series of 10 specimens, of which only nine were traced, eight in the BMNH and one in the NMNH. Only one paralectotype is conspecific with the lectotype of *maturescens*; the other seven belong to *argonais*.

DISTRIBUTION (Fig. 35). French Guiana, Colombia and Venezuela, in Tropical Moist Forest and Tropical Premontane Wet Forest.

## MATERIAL EXAMINED

7 ♂, 1 ♀ (3 ♂, 1 ♀ genitalia preparations).

**French Guiana:** lectotype ♂, R. Maroni, 1916 (*Le Moul*) (BMNH); 1 ♂ paralectotype, R. Maroni (*Le Moul*) (BMNH); 1 ♂, St Laurent, R. Maroni, 16.xi.1906 (*Le Moul*) (BMNH). **Colombia:** 2 ♂, Cundinamarca, Medina (*Fassl*) (BMNH); 1 ♂, Guainia, Rio Negro ('Ost Colomb.'), 800 m (*Fassl*) (BMNH). **Venezuela:** 1 ♀, Amazonas, San Carlos de Rio Negro, 125 m, 19–31.viii.1976 (*Salcedo & Fernández*) (UCV); 1 ♂, Bolívar, Rio Guaniamo, 160 m, 25–28.v.1979 (*Clavijo, Chacón & Fernández*) (UCV).

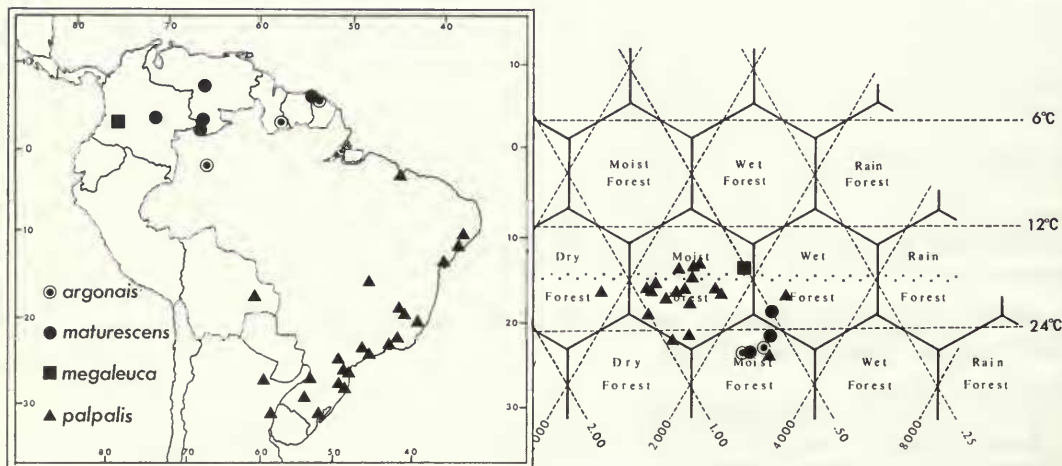


Fig. 35 Geographical and ecological distribution of the *albella*-group of *Timocratica*.

*Timocratica megaleuca* (Meyrick)

(Figs 35, 169)

*Stenoma megaleuca* Meyrick, 1912: 711; 1925: 224 [remarks]. Holotype ♀, COLOMBIA (BMNH) [examined].  
*Timocratica megaleuca* (Meyrick) Busck, 1935: 17 [catalogue]; Clarke, 1955: 391, pl. 195, figs 2–2b, 4a [adult, genitalia].

♀ 25 mm. Frons white, edged with fuscous. Second segment of labial palpus ochreous externally, basal half dark grey above, white internally; third segment white, distal half black. Thorax light fuscous above, except tegulae. Fore coxa above, distal half of tibia and fore tarsus dark fuscous; mid and hind tarsi ochreous. Fore wing with costa gently arched, apex angled, termen and tornus obliquely rounded; veins free; ochreous below, except along apex, termen and below cell. Hind wing white.

GENITALIA ♀ (Fig. 169). Margin of ostium bursae slightly expanded posteriorly as two small lobes. Antrum bent dorsally, posterior third cylindrical, anterior two-thirds narrowing progressively towards ductus bursae. Ductus bursae widening progressively towards corpus bursae. Corpus bursae pear-shaped, walls slightly wrinkled longitudinally as in ductus bursae. Signum an elliptical plate without spines along middle.

REMARKS. *T. megaleuca* is extremely similar to *palpalis* and possibly synonymous, as suggested by their ecological distribution. The genitalia of the only known specimen, the female holotype, differ very slightly from those of *palpalis*. However, as no males are available and, as the geographic distribution does not agree with that of *palpalis*, it seems preferable to retain it as a distinct species.

Meyrick (1925: 224), commenting upon his original description stated, "Thorax and abdomen of original type (still unique) described as white (I supposed them to be discoloured); actually the thorax is tinged greyish-ochreous except patagia, abdomen suffused pale greyish-ochreous becoming greyer posteriorly; I now think this colouring may be natural, but am not certain; there is nothing of the sort in any of the allied species. Otherwise the species is nearest *auxoleuca* [*palpalis*]."

DISTRIBUTION (Fig. 35). Colombia (known only from the type-locality), in Tropical Lower Montane Moist Forest.

## MATERIAL EXAMINED

**Colombia:** holotype ♀, Cauca, Popayán, 1906 (*L.*) (BMNH).

*Timocratica palpalis* (Zeller)

(Figs 4, 7, 13, 35–45, 136, 137, 168)

*Cryptolechia* (*Cryptolechia*) *palpalis* Zeller, 1877: 275. Holotype ♂, BRAZIL (MNHU) [examined].

*Stenoma auxoleuca* Meyrick, 1925: 223. Lectotype ♂, BRAZIL (BMNH), designated by Clarke, 1955: 387 [examined]. [Synonymized by Meyrick, 1926: 239.]

*Timocratica haywardi* Busck, 1938: 280, figs 1–2. Holotype ♂, ARGENTINA: Entre Rios, Concordia (*Hayward*) (NMNH) [not examined]. **Syn. n.**

*Stenoma palpalis* (Zeller) Meyrick, 1926: 239 [synonymy, distribution].

[*Timocratica palpalis* (Zeller);] Hempel, 1909: 68 [host, damage]; Ihering, 1909a: 228 [host, damage]; 1909b: 525 [host, damage].

[*Stenoma albella* (Zeller); Bondar, 1912: 15, figs 1–6, pl. 1 [host, damage, description]; Bondar, 1913: 24, figs 17–20 [host, damage, description]; Lima, 1928: 161 [host]; Andrade, 1928 [host, damage]; Lima, 1930 [cat.]; Santos, 1934: 36 [host, damage]; Barbosa, 1933: 288, fig. 113 [host, damage]; Ronna, 1933: 332 [host, damage]; Fonseca, 1934: 228 [host]; Monte, 1934: 176, figs 161–162 [host, damage]; Ronna, 1934a [host, damage]; 1934b [host, damage]; Pyenson, 1938 [host, damage]; Carvalho & Carvalho, 1939: 47 [hosts]; Lima, 1950: 1 [damage, control]; Silva & Heinrich, 1950: 9 [hosts]; Bertels, 1954: 61 [hosts]. Misidentifications.]

[*Timocratica albella* (Zeller); Lima, 1936: 277 [hosts]; Araujo, 1937: 310 [host, control]; Caldeira & Vieira, 1938 [host]; Biezanko & Freitas, 1938: 27 [catalogue, hosts]; Biezanko & Seta, 1939 [hosts]; Costa, 1942: 248 [host, damage]; Lima, 1945: 269 [hosts, damage, description, genitalia]; Lepage & Figueiredo, 1946 [hosts]; Duarte, 1947: 192 [host, damage, control]; Biezanko, Bertoldi & Baucke, 1949 [hosts]; Lofti, 1949: 20 [host, damage, control]; Robbs, 1953: 80 [host]; Costa, 1958: 139 [host, damage]; Robbs, 1960: 91 [host, damage]; Biezanko, 1961a: 12 [hosts]; 1961b: 6 [host]; Mariconi & Soubihe,

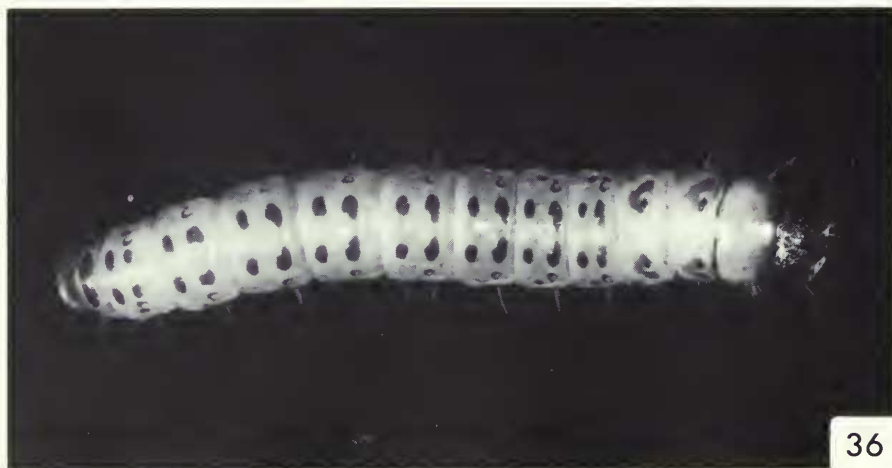
1961: 35 [host, damage]; Maranhão, 1962: 9 [host]; Pinheiro, 1962: 248 [host]; Mariconi, 1963: 389, figs 178C–D [hosts, damage, description, control]; Sefer, 1963: 42 [host]; Silva *et alii*, 1968 [hosts]; Gallo *et alii*, 1970: 570 [hosts, damage]. Misidentifications.]

*Timocratica palpalis* (Zeller) Busck, 1935: 17 [catalogue].

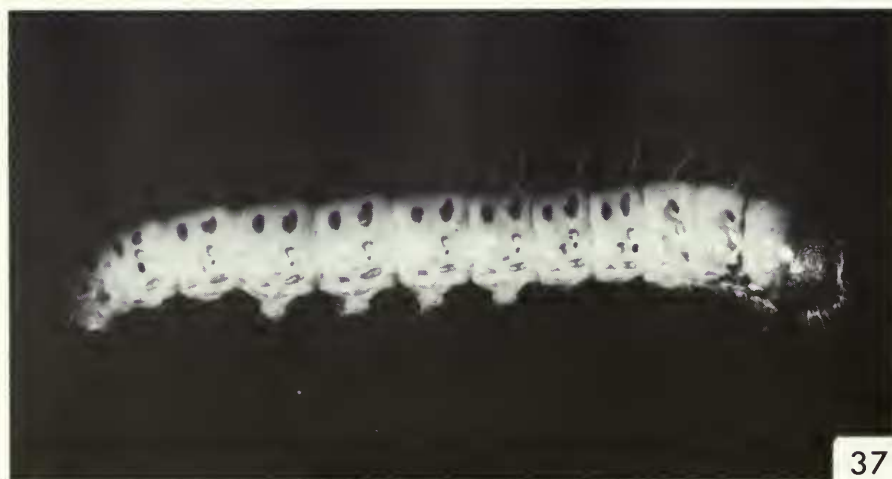
*Timocratica auxoleuca* (Meyrick) Clarke, 1955: 387, pl. 193, figs 2–2b [adult, genitalia]; Hayward, 1969: 72 [hosts].

♂ 14–24 mm, ♀ 19–25 mm. Frons white, edged with fuscous. Second segment of labial palpus ochreous below except near distal articulation, basal half dark grey above, white internally and near distal articulation; third segment white, distal half becoming progressively dark grey towards apex. Fore coxa, femur and basal half of tibia ochreous above, femur tinged with dark grey above, distal half of tibia, and tarsus dark greyish-fuscous; mid and hind tarsi ochreous. Fore wing with costa gently arched, apex angled, termen and tornus obliquely rounded; veins free; underside above cell and veins golden-ochreous, except along apex and termen. Hind wing and abdomen white.

GENITALIA ♂ (Figs 136, 137). Uncus with lateral margins parallel or narrowing slightly towards apex, apex concave. Apex of gnathos wide, rounded. Digitate processes of juxta wide basally, narrowing towards apex, distal two-thirds with long setae dorsally. Valva with margins nearly parallel or somewhat broadened at distal third, sacculus slightly pronounced. Aedeagus somewhat bent ventrad, vesica with strong bent cornutus and several smaller spines.



36



37

Figs 36, 37 *Timocratica palpalis* (Zeller), last instar larva, Brazil, Santa Catarina, ex *Psidium guajava*. 36, dorsal view; 37, lateral view.

GENITALIA ♀ (Fig. 168). Margin of ostium bursae slightly concave at middle. Antrum long, posterior third nearly cylindrical, anterior two-thirds narrowing progressively towards ductus bursae, with few longitudinal wrinkles. Ductus bursae widening progressively towards corpus bursae. Corpus bursae pear-shaped, walls strongly wrinkled as in ductus bursae. Signum a long elliptical plate, slightly constricted at middle, without spines in central area.

PUPA. ♂, ♀, length 15–19 mm, maximum diameter 4.5–5.5 mm. Indistinguishable from that of *melanocosta*.

LARVA (Figs 36–42). Maximum length 35 mm; cylindrical, dark pinkish violet; pinacula large, well defined, slightly prominent, dark brown. Anal comb absent. Meso- and metathorax with extra sclerotized area, 'pinacula without setae', between setae L and setae SV1; abdominal segments 1–2 with two extra sclerotized areas, 'pinacula', on each segment, one behind spiracle, between setae SD and setae L, the other behind L1 + L2, above L3; segments 3–7 with three extra sclerotized areas, two as in segments 1–2 and a third in front of L3, above setae SV. Abdominal prolegs with 112–116 crochets in triordinal circle, anal prolegs with 58–62 crochets arranged triordinally in anal penellipse. Head hypognathous, nearly spherical, with irregular, hexagonally sculptured surface, dark brown; adfrontal area not reaching to vertical angle; only primary setae present; mandible with two small blunt teeth; ocellus V below antenna; adfrontal area slightly prominent near clypeus; setae P2 closer to each other than setae P1. Prothoracic plate prominent, strongly sclerotized, dark brown, with irregularly sculptured area behind setae SD2; D1 equidistant to XD1 and D2, below level of former, posterior to second; SD2 between XD2 and SD1, slightly posterior to both; MXD1, MD1 and MSD1 present; L1, L2, L3 on same pinaculum; SV1 and SV2 on same pinaculum; spiracle vertically elongated. Meso- and metathorax with D1, D2, SD1 and SD2 on same pinaculum; D1 slightly posterior to D2; pinaculum L1 + L2 slightly connected with L3; SV1 below L3. Abdomen with spiracle on segment 1 twice the size of others; setae D1 on segments 1–2 slightly closer to each other than setae D2, further apart on 3–7; SD2 on segments 1–8 present but greatly reduced; SV3 absent on segments 1 and 7–9.

REMARKS. *T. palpalis* is easily distinguished from any other species from southern South America, except *isarga*, by the dark fuscous fore tarsi and dark fuscous distal half of fore tibiae. *T. isarga* has similarly coloured tarsi and tibiae but has the fore wings white below,  $CuA_1$  and  $CuA_2$  stalked, and the hind tarsi white. *T. megaleuca* from Colombia is probably also a synonym of *palpalis*, as discussed on p. 253.

As a large number of specimens were available for study, either collected at light or reared on different hosts and from different places, some variation in size and genitalia was found. Specimens from warmer areas such as the east, the Central Plateau and the coast of Brazil, south to the lowlands of Santa Catarina, are on average larger than those from the Parana Plateau, south Brazil and Argentina. Variation of the male genitalia occurs mainly in the shape of the valva and digitate processes of the juxta. The valva may be slightly narrowed with the margins nearly parallel, or have the distal half somewhat broadened and the sacculus slightly pronounced. In some specimens the digitate processes of the juxta are broad, nearly triangular, with the margins converging progressively towards the apex, whereas in others the distal half is very narrow.

This species, referred to as *albella* (Zeller) in the Brazilian economic literature, is the most common species in the south of South America, mainly in southern Brazil and northern Argentina, and is a pest of ornamental, fruit and timber trees. As the adults are almost white, it was originally identified by Bondar (1912: 15) as *Stenoma albella* (Zeller) and this name has been used by all subsequent authors; at that time *albella* appeared to be the only available name for a large white stemmine, since *grandis* has golden-yellow hind wings, and *palpalis* was still considered an Indian species.

Although the holotype bears the label 'Bengal', there is no doubt that it represents this South American species, as pointed out by Meyrick (1926: 239).

BIOLOGY. The larvae of *T. palpalis* are polyphagous bark-feeders and considered to be pests of ornamental, fruit and timber trees in Brazil and Argentina. They tunnel into the trunk and larger branches of the host-plant, feeding on the bark surrounding the holes (Fig. 43). No branches of less than 2 cm diameter were found infested. The tunnel is shallow, only 5–8 cm long and about 0.5 cm wide when the larva is ready to pupate. The tunnel begins more or less at right angles to the axis of the wood and then follows the pith (Fig. 45). Larvae collected in Brusque, Santa Catarina, were tunnelling the trunk upwards, whereas those collected in Sete Lagoas, Minas Gerais, were tunnelling down towards the base of the tree. In the former locality it rains throughout the year, making it necessary to tunnel upwards to avoid flooding of the hole, whereas in Sete





Fig. 43 Damage caused by larvae of *Timocratica palpalis* (Zeller) on the trunk of *Tibouchina candolleiana*.

Pupation takes place inside the tunnel; the pupa is attached by the cremaster to a few strands of silk on the tunnel wall.

Field observations and label data show that there are differences in the flight period of adults, and specimens from warmer areas emerge earlier in the season than those from cooler places. Most specimens from Minas Gerais were collected from early October to late February, those from the lowlands of Santa Catarina, further south, emerged at the beginning of December, specimens from Rio Grande do Sul were collected in January, while those bred by Hayward in Argentina emerged in March. Possibly the species has two generations in warmer localities, but is univoltine further south where the average temperature is lower.

*T. palpalis* is usually a minor pest, but when infestation is high it may seriously damage the trees (Fig. 43). When the trunk or branch is ring-barked, the tree dies beyond that point. In some Myrtaceae, such as guava (*Psidium guajava* L.), the bark never recovers and the trunk becomes deformed where it was damaged. In Brasilia, strong infestation was found in a number of *Tibouchina candolleiana* (Melastomataceae), an ornamental tree with attractive pink and violet flowers. Some of the trees contained more than 100 larvae. Considering that one larva can seriously damage or even kill a whole branch, such an infestation is very serious.

It seems that the preferred host-plants are Myrtaceae, mainly species of *Psidium*, and it is very easy to find the larvae feeding on guava, a common fruit tree in South America. Table 2 gives a list of the host plants of *palpalis* based on my own observations and the literature.

**Table 2** Food plants of *T. palpalis*

Scientific names	English vernacular names	Brazilian vernacular names
<b>ACERACEAE</b>		
<i>Acer saccharinum</i>	Silver maple	
<i>A. platanoides</i>	Norway maple	
<b>CASUARINACEAE</b>		
<i>Casuarina equisetifolia</i>	Casuarina, Willow, Whistling pine	Casuarina
<b>CUNONIACEAE</b>		
<i>Belangeria tomentosa</i>		Cangalheiro
<b>EBENACEAE</b>		
<i>Diospyros kaki</i>	Kaki	Caqui
<b>FAGACEAE</b>		
<i>Castanea sativa</i>	Sweet chestnut	Castanheira
<i>Quercus robur</i>	British oak	Carvalho-inglês
<b>LAURACEAE</b>		
<i>Persea americana</i>	Avocado pear	Abacateiro
<b>MELASTOMATACEAE</b>		
* <i>Tibouchina candolleiana</i>		Quaresmeira
* <i>T. urvilleana</i>		Quaresmeira
<b>MYRTACEAE</b>		
<i>Calycorectes pohlianus</i>		Cambucazeiro
<i>Campomanesia acida</i>		Araçá-do-Pará
<i>Eucalyptus alba</i>	Timor white gum	Eucalipto
<i>E. camaldulensis</i>	Murray red gum	Eucalipto
(= <i>E. rostrata</i> )		
<i>E. citriodora</i>	Lemon scented spotted gum	Eucalipto
<i>E. propinqua</i>		Eucalipto
* <i>E. saligna</i>	Sydney blue gum, Saligna gum	Eucalipto
<i>E. tereticornis</i>	Forest red gum	Eucalipto

\* Author's observations; others were quoted from Araujo *et al.* (1968) and Hayward (1969), and from label data. English vernacular names follow Adams (1972) and Bailey (1900–02); Brazilian vernacular names of the Myrtaceae follow Legrand & Klein (1967–78).

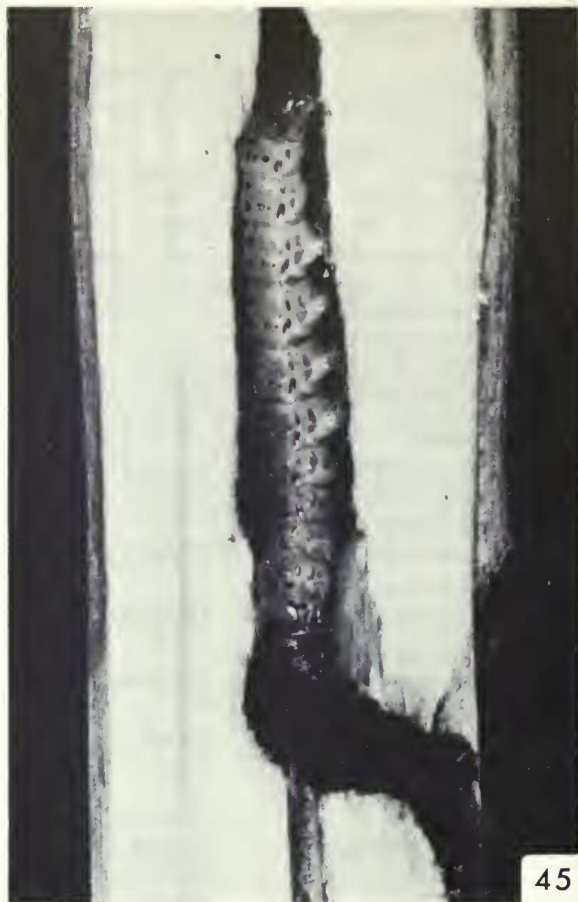


**Table 2** (continued)

Scientific names	English vernacular names	Brazilian vernacular names
<i>Eugenia brasiliensis</i>		Grumixameira
<i>E. uniflora</i>	Surinam cherry	Pitangueira
* <i>E. involucrata</i>		Cerejeira-de-folha-miúda
<i>Hexachlamys edulis</i>		Cereja-do-Rio Grande
<i>Marlierea tomentosa</i>		Garapuruna
<i>Myrcia fenzliana</i>		Guamirim-araçá
<i>Myrciaria trunciflora</i>		Jaboticabeira
* <i>Psidium guajava</i>	Guava	Goibeira
<i>P. guineense</i>	Guiana guava	Araçá-azedo
<i>P. humile</i>		Araçá-vermelho
<i>Syzygium jambos</i>	Rose apple	Jambeiro
<i>S. malaccense</i>	Otaheite apple	Jambeiro-vermelho
<b>PLATANACEAE</b>		
<i>Platanus orientalis</i>	Oriental plane	Plátano-oriental
<b>PROTEACEAE</b>		
<i>Macadamia ternifolia</i>	Queensland nut	Macadamia
<b>PUNICACEAE</b>		
<i>Punica granatum</i>	Pomegranate	Romanzeira
<b>ROSACEAE</b>		
<i>Cydonia vulgaris</i>	Quince	Marmeleiro
<i>Eriobotrya japonica</i>	Loquat	Ameixeira-do-Japão
* <i>Malus domestica</i>	Apple	Macieira
<i>M. sylvestris</i>	Crab apple	Macieira-silvestre
<i>Prunus amygdalus</i>	Almond	Amendoeira
<i>P. armeniaca</i>	Common apricot	Abricó
<i>P. domestica</i>	Common garden plum	Ameixeira
<i>P. persica</i>	Peach	Pêssego
* <i>Pyrus communis</i>	Common pear	Pereira
* <i>P. sinensis</i>	Sand pear, Japanese pear, Chinese pear	Pereira-do-Japão
<b>RUBIACEAE</b>		
<i>Coffea arabica</i>	Arabian coffee	Cafeeiro
<b>SALICACEAE</b>		
<i>Salix viminalis</i>	Osier willow	Vimeiro
<b>TILIACEAE</b>		
<i>Luehea divaricata</i>		Açoita-cavalo
<b>ULMACEAE</b>		
<i>Ulmus americana</i>	White elm	

Sometimes the larvae are heavily parasitized. About 80 per cent of the larvae collected in Brasilia on *Tibouchina candolleiana* were parasitized by an apparently undescribed species of *Eudeleboea* Blanchard (Ichneumonidae). They may also be preyed on by birds. A wild guava (*Psidium* sp.), found near Planaltina, Distrito Federal, at the beginning of September 1978 had branches attacked by three larvae. However, it was found that each larval gallery had a fresh hole near the middle, made by an unidentified species of woodpecker, through which the bird had removed the larva. It is interesting to note that *Psidium* species have a very hard wood and the bird had to make a hole 2 cm deep to reach the larvae.

**DISTRIBUTION** (Fig. 35). Northern Argentina, Bolivia, Brazil. This species has not only a wide range of food-plant preference and geographical distribution, but also a wide range of ecological



Figs 44–45 Damage caused by larvae of *Timocratica palpalis* (Zeller). 44, branch of *Pyrus communis* with areas partially covered by frass (*O. Mielke* photo). 45, split branch of *Psidium guajava* showing larva inside gallery.

range of food-plant preference and geographical distribution, but also a wide range of ecological distribution. It has been collected from Warm Temperate Dry Forest, in the North Argentina 'Chaco' area, and Warm Temperate Moist Forest of southern Brazil and Argentina, crossing the Subtropical Moist Forest of southern Brazil, up to the Tropical Moist Forest of the north-east Brazilian coast. The high concentration of localities in Warm Temperate and Subtropical Moist Forest Life Zones does not indicate that this species is chiefly associated with these Life Zones, but probably means that the species has been more intensely collected there.

#### MATERIAL EXAMINED

71 ♂, 31 ♀, 8 larvae, 4 pupae (9 ♂, 5 ♀ genitalia preparations).

**Argentina:** 5 ♂ paratypes of *T. haywardi*, Entre Rios, Concordia, ex guava [*Psidium guajava* L.], iii.1937 (*Hayward*) (BMNH; NMNH); 1 ♂ paratype of *T. haywardi*, Entre Rios, Concordia, ex pomegranate [*Punica granatum* L.], iii.1938 (*Hayward*) (NMNH); 1 ♂, Santa Fé, Villa Ana, iii.1924 (*Hayward*) (BMNH). **Bolivia:** 1 ♂, Nuflo de Chaves, Esperanza (BMNH). **Brazil:** holotype ♂ of *C. palpalis*, 'Bengal' (MNHU); lectotype ♂ of *S. auxoleuca*, Espirito Santo, Leopoldina, 1924 (BMNH); 1 ♂, no further data (BMNH); 1 ♂, 2 ♀, Alagoas, Maceió ['Maceo'] (BMNH); 1 ♂, 2 ♀, Bahia, Salvador (*Fruhstorfer*) (BMNH); 3 ♂, Distrito Federal, Brasilia, 10.x.1979 (*Gomes*) (VB); 10 ♂, 2 ♀, Distrito Federal, Planaltina, 5–25.xi.1975, 12.ii.1976, 6–15.xi.1977, 20.ii.1978, 21.xi.1978 (*Becker*) (VB; BMNH; MNHU; NM; NMNH); 3 ♂, 8 larvae, 4 pupae, Distrito Federal, Planaltina, 1000 m, ex *Tibouchina candolleiana*, 9–16.xi.1978 (*Becker*) (VB; BMNH);

NMNH); 1 ♀, Espírito Santo, 1910 (*Fruhstorfer*) (BMNH); 1 ♂, Minas Gerais, Leopoldina (*Staudinger*) (MNHU); 1 ♀, Maranhão (BMNH); 1 ♂, Agua Suja, x.1906 (*Baer*) (BMNH); 2 ♂, Minas Gerais, Cordisburgo, ex *Psidium guajava*, 5.16.xi.1974 (*Becker*) (VB); 3 ♂, 2 ♀, Minas Gerais, Cordisburgo, ex *Eugenia involucrata*, 3.x–23.xi.1974 (*Becker*) (VB; BMNH); 3 ♂, Minas Gerais, Sete Lagoas, 720 m, 20.i, 10, 18.ii.1969 (*Becker*; *Biezanko*) (VB; LN); 4 ♂, 2 ♀, Minas Gerais, Sete Lagoas, 720 m, ex *Psidium guajava*, 2.x–14.xii.1974, 8.ii.1975 (*Becker*) (VB; BMNH; NMNH); 7 ♂, Paraná, Castro, 1896–1898 (*Jones*) (BMNH); 1 ♂, 1 ♀, Paraná, Curitiba, 920 m, 11.xii.1971, 2.ii.1974 (*Becker*) (VB); 2 ♂, Paraná, Mandirituba, 13.xii.1969 (*Becker*) (VB); 1 ♀, Pernambuco, Serra do Comunati (*Gounelle*) (BMNH); 1 ♂, 1 ♀, Rio de Janeiro (BMNH); 1 ♂, Rio Grande do Sul, Guarani, 7.i.1954 (*Biezanko*) (BMNH); 1 ♂, Rio Grande do Sul, Pelotas, 29.i.1960 (*Biezanko*) (BMNH); 1 ♂, Rio Grande do Sul, Pelotas, 22.i.1965 (*Guerra*) (VB); 2 ♀, Rio Grande do Sul, Santa Maria, ex *Malus domestica*, 16.ii.1979 (*Link*); 1 ♂, 2 ♀, Rio Grande do Sul, Santa Maria, ex *Pyrus communis*, 16.ii.1979 (*Link*); 1 ♂, 3 ♀, Rio Grande do Sul, Santa Maria, ex *Psidium guajava*, 17.ii.1979 (*Link*); 1 ♂, 1 ♀, Rio Grande do Sul, Santa Maria, ex *Luehea divaricata*, 28.ii.1979 (*Link*) (all VB); 1 ♂, 4 ♀, Santa Catarina, Brusque, ex *Psidium guajava*, 6–29.xii.1970 (*Becker*) (VB; BMNH; NMNH); 1 ♀, Santa Catarina, Corupá, xii.1955 (*Maller*) (NMNH); 1 ♂, Santa Catarina, Rio Vermelho, vii.1954 (*Maller*) (NMNH); 2 ♂, São Paulo, São Paulo, 1889 (*Jones*) (BMNH); 1 ♂, 1 ♀, São Paulo, 1910 (*Ihering*) (BMNH); 4 ♂, São Paulo, Piracicaba, 540 m, xii.1965–i.1966 (ESALQ).

*Timocratica melanocosta* sp. n.

(Figs 46–53, 138, 139, 173)

♂ 14–18 mm, ♀ 16–19 mm. Frons white. Second segment of labial palpus golden-ochreous, white internally and around distal articulations; third segment black with white scales towards base. Fore coxa below, femur and basal two-thirds of tibia golden-ochreous above; distal third of tibia, and tarsus dark fuscous below, mixed with white scales above; distal joint of mid femur, and tibia golden-ochreous externally, mid tarsus dark fuscous below, or white, proximal articulations of hind tibia slightly tinged with golden-ochreous. Fore wing with costa strongly arched at base, then gently arched, apex angled, termen slightly obliquely rounded, tornus rounded; veins free; basal third of costa tinged with dark grey; white below. Hind wing and abdomen white.

GENITALIA ♂ (Figs 138, 139). Lateral margins of uncus nearly parallel, apex strongly concave, nearly bifurcate. Apex of gnathos nearly triangular. Digitate processes of juxta broadened basally, narrowing progressively to basal third, then straight; distal half with sparse setae dorsally. Valva with margins nearly parallel, sacculus slightly pronounced. Aedeagus nearly straight, vesica with strong cornutus and many acutely pointed spines opposite.

GENITALIA ♀ (Fig. 173). Margin of ostium bursae rounded. Antrum funnel-shaped, bent, with strong longitudinal wrinkles. Ductus bursae broadening progressively towards corpus bursae. Corpus bursae pear-shaped, walls slightly wrinkled as in ductus bursae. Signum a round or elliptical plate without spines at middle.

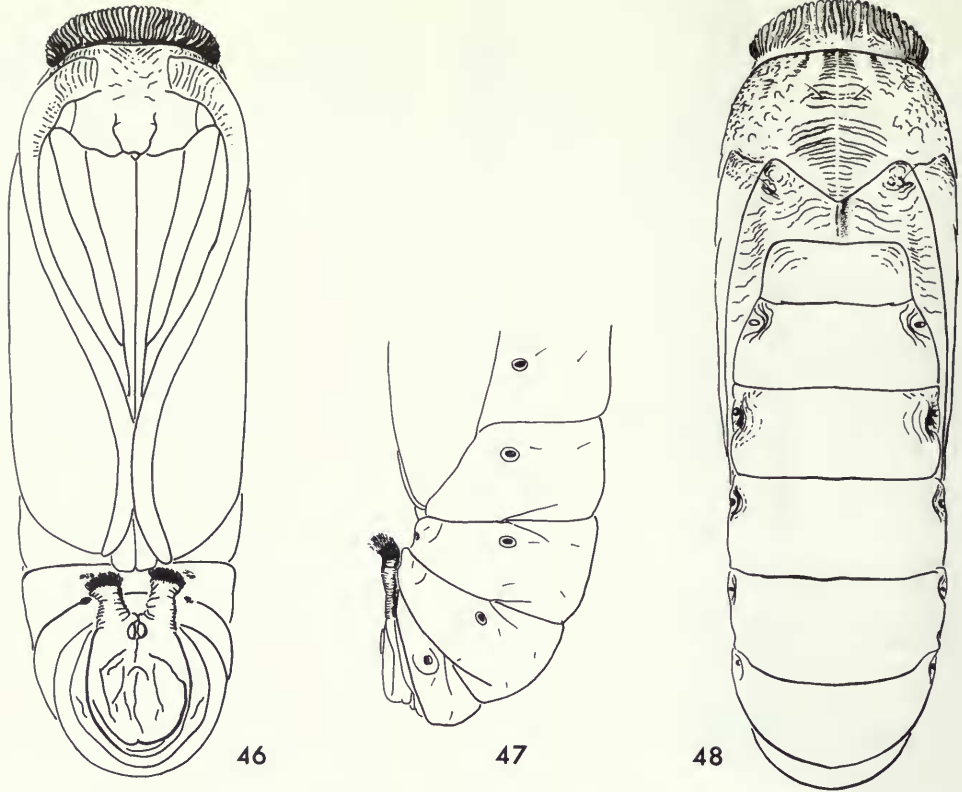
PUPA (Figs 45–47). ♂, length 16–17 mm, maximum diameter 4.5–5.0 mm. Brown, darker towards head. Setae minute. Pronotum strongly expanded forwards, displacing pronotum-head suture to a ventral position, longitudinally wrinkled. Meso- and metanotum irregularly wrinkled. Cremaster with pair of long processes, directed cephalad, reaching sixth segment, apices with many small, hook-like setae.

LARVA. Maximum length 30 mm. Very similar to that of *palpalis* and almost indistinguishable from it, except for the following characters: extra sclerotized area, 'pinaculum without setae', behind spiracle greatly reduced on abdominal segments 3–4, absent on segments 5–7.

REMARKS. *T. melanocosta* is nearest to *palpalis*, but easily distinguishable from it, and others in the group, by the grey tinge along the basal third of the fore wing costa.

Specimens from Bananal Island, reared from *Byrsonima* sp., have the mid tarsus almost white whereas most specimens, such as those from Minas Gerais and Distrito Federal, have tarsi which are dark fuscous below. However, in all other respects, including genitalia, the specimens agree very well.

BIOLOGY. The behaviour and feeding habits of the larvae of this species are almost the same as in *palpalis* (Figs 50–52). Most of the specimens studied were obtained from larvae feeding on *Erythroxylum suberosum* (Erythroxylaceae) and *Byrsonima* sp. (Malpighiaceae).



Figs 46–48 *Timocratica melanocosta* sp. n., pupa. 46, ventral view. 47, lateral view. 48, dorsal view.

**DISTRIBUTION** (Fig. 53). Brazil (Central Plateau and dry areas of the southern border of the Amazon Basin). Specimens were collected in Tropical Premontane Moist Forest and Tropical Moist Forest. However, it is important to point out that its host plants are not part of a climatic association, but are one of the components of the atmospheric monsoon-type of association called 'cerrado' in Brazil (Fig. 49) (see discussion of this association under *major*, p. 231).

**MATERIAL EXAMINED**

34 ♂, 27 ♀, 8 larvae, 4 pupae (6 ♂, 5 ♀ genitalia preparations).

Holotype ♂, **Brazil**: Distrito Federal, Planaltina, 1000 m, 9.xi.1977 (*Becker*) (MN).

Paratypes. **Brazil**: 4 ♂, 3 ♀, Minas Gerais, Sete Lagoas, 720 m, ex *Erythroxylum suberosum*, 13.x–18.xi.1974, 26.x.1978 (*Becker*) (VB; BMNH); 2 ♂, 1 ♀, Distrito Federal, Brasília, 1000 m, 10.x.1979 (*Gomes*) (VB); 8 ♂, 2 ♀, Distrito Federal, Planaltina, 1000 m, 5.xi, 23.xi, 16.xii.1975, 11.xi.1977, 26.x–10.xi.1978 (*Becker*) (VB; BMNH; MNHU; NMNH); 19 ♂, 21 ♀, 8 larvae, 4 pupae, Goiás, Bananal I., ex *Byrsonima* sp., 24.x–15.xi.1977 (*Becker*) (VB; BMNH; LN; MNHU; NM; NMNH; ZSBS).

***Timocratica nivea* sp. n.**

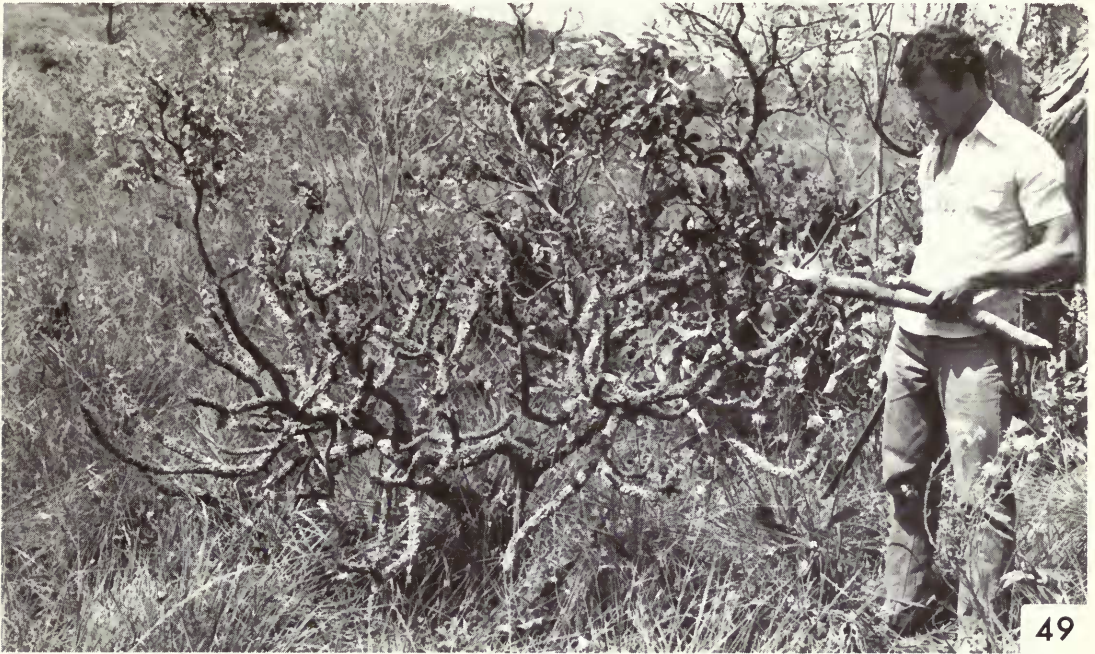
(Figs 22–24, 54, 140, 141, 171)

♂ 15–17 mm, ♀ 19–20 mm. Frons white. Second segment of labial palpus white with black scales basally above; third segment white below, black above. Legs white; fore coxa tinged with golden-yellow, fore femur above, tibia and tarsus dark grey below. Fore wing with basal third of costa arched, distal two-thirds nearly straight; apex angled, termen and tornus obliquely rounded; veins free or  $CuA_1$  and  $CuA_2$  connate or stalked; white below. Hind wing and abdomen white.

**GENITALIA** ♂ (Figs 140, 141). Lateral margins of uncus nearly parallel; apex strongly concave, nearly bifurcate. Apex of gnathos pointed. Digitate processes of juxta with lateral margins parallel, narrowing

progressively near apex, with sparse setae on distal half dorsally. Valva with margins nearly parallel or somewhat broadened at middle, bent dorsally. Aedeagus bent ventrad at basal third, vesica with strong bent cornutus and many smaller spines of different sizes opposite.

GENITALIA ♀ (Fig. 143). Margin of ostium bursae rounded. Antrum wide, somewhat narrowed towards anterior end, with a few strong longitudinal wrinkles. Ductus bursae broadening progressively towards



Figs 49–52 Habitat and food-plant (*Erythroxylum suberosum*) of *Timocratica melanocosta* sp. n. 49, habitat and food-plant. 50–52, branches of the food-plant showing (50) eaten areas of bark covered with frass, (51) eaten area exposed with entrance hole of larval gallery, (52) split branch with gallery and pupa.

corpus bursae, scobinate. Corpus bursae pear-shaped, finely scobinate. Signum a round plate without spines at middle.

REMARKS. *T. nivea* is similar to *melanocosta*, *albella* and *isarga* but is easily distinguished by the absence of ochreous coloration on its labial palpi. The male and female genitalia are very close to those of *melanocosta*, except for the narrow base of the digitate processes of the juxta in the male. The arrangement of the *CuA* veins is very variable. Of 11 specimens examined, two females and four males have these veins free, two have them connate, two shortly stalked, and in one specimen they are connate on the left wing and shortly stalked on the right (Figs 22–24).

DISTRIBUTION (Fig. 53). Brazil (Central Plateau). This species is sympatric with *melanocosta* (see discussion on ecology under that species, p. 262).

#### MATERIAL EXAMINED

10 ♂, 3 ♀ (3 ♂, 2 ♀ genitalia preparations).

Holotype ♂, **Brazil**: Distrito Federal, Planaltina, 1000 m, 15.xi.1975 (*Becker*) (MN).

Paratypes. **Brazil**: 1 ♂, Minas Gerais, Sete Lagoas, 720 m, 18.x.1969 (*Becker*) (VB); 8 ♂, 3 ♀, Distrito Federal, Planaltina, 1000 m, 5–15.xi.1975, 11.xi.1976, 10.xi.1978, 10.x.1979 (*Becker, Gomes*) (VB; BMNH; NMNH; MNHU).

### *Timocratica albitogata* sp. n.

(Figs 53, 144, 145, 167)

♂ 19–25 mm, ♀ 25–28 mm. Frons white. Second segment of labial palpus dark grey above on basal half, tinged with ochreous basally below, white internally; third segment white, becoming progressively black from basal third to apex. Fore coxa and femur golden-ochreous below, fore tibia and tarsus dark greyish-fuscos below; distal half of tibia, and tarsus white above; mid and hind tarsus golden-ochreous. Fore wing with costa gently, evenly rounded; apex nearly rounded, somewhat angled; termen and tornus obliquely rounded; veins free; white below. Hind wing and abdomen white.

GENITALIA ♂ (Figs 144, 145). Uncus with lateral margins nearly parallel, apex strongly concave. Apex of gnathos narrow. Digitate processes of juxta very long, lateral margins nearly parallel, distal half with long setae above. Valva long, margins evenly rounded, nearly parallel, narrowing progressively from apical third to apex. Aedeagus nearly straight, vesica with strong bent cornutus and several smaller spines.

GENITALIA ♀ (Fig. 167). Margin of ostium bursae nearly straight. Antrum very wide posteriorly, narrowing progressively towards ductus bursae, with few longitudinal wrinkles. Ductus bursae somewhat constricted near antrum, widening progressively towards corpus bursae. Corpus bursae pear-shaped, walls wrinkled longitudinally as in ductus bursae. Signum an elongate elliptical plate without spines at centre.

REMARKS. *T. albitogata* is very close to *palpalis*, but usually larger. Like *melanocosta*, it can easily be distinguished from *palpalis* by the white underside of the fore wings and the white dorsal side of the fore tarsi. It differs from *melanocosta* by its larger size, white fore wing costa and ochreous hind tarsi.

DISTRIBUTION (Fig. 53). South-east Brazil. This species appears to be restricted to the Subtropical Region of South America. The localities where the type-series was collected are in Subtropical Moist Forest, Subtropical Lower Montane Moist Forest and Subtropical Lower Montane Wet Forest. It can be expected to occur further south, in the Warm Temperate Moist Forest of Rio Grande do Sul and possibly in Uruguay and Argentina.

#### MATERIAL EXAMINED

21 ♂, 4 ♀ (3 ♂, 2 ♀ genitalia preparations).

Holotype ♂, **Brazil**: Paraná, Curitiba, 920 m, 10.ii.1975 (*Becker*) (MN).

Paratypes. **Brazil**: 17 ♂, 4 ♀, Paraná, Curitiba, 920 m, xii.1974–ii.1975 (*Becker*) (VB; BMNH; NMNH; NM; MNHU; ZSBS); 2 ♂, Mato Grosso, Rio Brilhante, 25.i.1971 (*Becker*) (VB); 1 ♂, Rio de Janeiro, [? Itatiaia] (*Zikán*) (NMNH).

*Timocratica* species 6

(Figs 53, 165)

♀ 23–27 mm. Frons white, edged with fuscous. Second segment of labial palpus ochreous below, basal half dark fuscous above, distal half white above and internally; third segment white, fuscous towards apex. Antenna fuscous, except scape and base of flagellum white. Fore femur above, distal half of tibia above and fore tarsus dark fuscous; fore coxa below, mid and hind tarsi golden-yellow. Fore wing with costa gently arched, apex angled, termen and tornus rounded; veins free; underside golden-yellow, fuscous along apex and termen. Hind wing tinged with golden-yellow along costa and termen. Abdomen white.

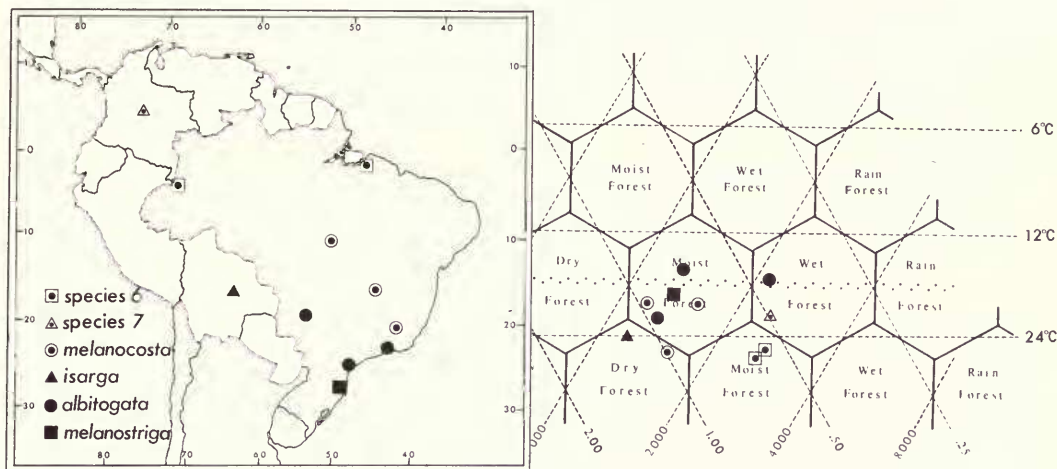


Fig. 53 Geographical and ecological distribution of the *albella*-group of *Timocratica*.

GENITALIA ♀ (Fig. 165). Margin of ostium bursae slightly concave. Antrum long, posterior third funnel-shaped, anterior two-thirds strongly wrinkled longitudinally, bent at connection with ductus seminalis. Ductus bursae broadening progressively towards corpus bursae. Corpus bursae oblong, walls slightly wrinkled longitudinally as in ductus bursae. Signum an elongate plate without spines along middle.

REMARKS. This species is very similar to *argonais* but can easily be distinguished by the hind wings which are tinged with yellow above along the costa and termen, and by the narrow antrum of the female genitalia.

Although the ecology of the Bolivian specimen differs from that of specimens from Brazil, their genitalia are similar; because of the poor condition of the Bolivian specimen they cannot be separated on superficial characters.

DISTRIBUTION (Fig. 53). Bolivia, Brazil. Both Brazilian localities are in Tropical Moist Forest; the Bolivian locality is in a transitional zone between Subtropical Moist Forest and Tropical Premontane Dry Forest.

## MATERIAL EXAMINED

3 ♀ (2 genitalia preparations).

**Bolivia:** 1 ♀, Santa Cruz, Santa Cruz de la Sierra (*Steinbach*) (BMNH). **Brazil:** 1 ♀, Amazonas, Benjamin Constant, xi.1942 (*Pohl*) (NMNH); 1 ♀, Pará, Belém (*Moss*) (BMNH).

*Timocratica* species 7

(Figs 53, 166)

♀ 22 mm. Frons white, edged with light fuscous. Second segment of labial palpus white, basal half ochreous below and dark fuscous externally above; third segment dark fuscous, few white scales basally. Antenna white, slightly fuscous towards apex. Fore coxa below, fore and mid femur above, basal half of fore tibia

above, mid and hind tarsi golden-yellow; distal half of fore tibia above and fore tarsus dark fuscous. Fore wing with costa gently arched, apex right-angled, termen and tornus rounded; golden-ochreous below above cell, dark fuscous along apex and termen. Hind wing upperside white, underside golden-yellow along costa. Abdomen white.

GENITALIA ♀ (Fig. 166). Margin of ostium bursae slightly concave. Antrum long, posterior third nearly cylindrical, anterior two-thirds curved, strongly wrinkled longitudinally. Ductus bursae nearly cylindrical. Corpus bursae oblong, walls plain and smooth. Signum an elongate plate without spines along middle.

REMARKS. This species is very similar externally to species 6 and to *argonais*; however, it can easily be distinguished from the former by the white upperside of the hind wings, and from the latter by the narrower antrum and undivided signum. It almost certainly represents a distinct species, but as no males are known it has not been named here.

DISTRIBUTION (Fig. 53). Colombia. The locality where the only specimen was collected is presumably in Tropical Premontane Wet Forest.

MATERIAL EXAMINED

Colombia: 1 ♀, Cundinamarca, Medina (*Fassl*) (BMNH).

*Timocratica melanostriga* sp. n.

(Figs 53, 68, 174)

♀ 21 mm. Frons white. Second segment of labial palpus golden-ochreous except distal half above and around distal articulation; third segment dark grey with a few white scales basally. Antenna dark fuscous, scape and base of flagellum white. Fore coxa, femur and tibia golden-ochreous, distal third of tibia except articulations dark greyish fuscous; tarsus dark greyish-fuscous, ochreous on articulations; distal half of mid femur ochreous below, tinged with grey externally at middle; mid tibia fuscous with ochreous scales above, tarsus fuscous with ochreous scales; third tarsus ochreous below with fuscous scales. Thorax and abdomen white with a dark grey mediodorsal line. Fore wing with costa gently arched, apex rounded, termen and tornus obliquely rounded; veins free; basal half of veins  $R_3 - M_3$ ,  $1A + 2A$ , fold and middle of cell dashed with dark greyish-fuscous; underside white, same veins marked with fuscous. Hind wing with veins and dorsal half of cell fuscous.

GENITALIA ♀ (Fig. 174). Margin of ostium bursae slightly expanded posteriorly, concave at middle. Antrum slightly constricted after insertion of ductus seminalis, anterior two-thirds narrowing slightly towards ductus bursae, walls scobinate and wrinkled longitudinally. Ductus bursae widening progressively towards corpus bursae. Corpus bursae pear-shaped, walls as in ductus bursae, finely scobinate. Signum a small, irregular plate.

REMARKS. *T. melanostriga* is the only white *Timocratica* species with dark markings on the wings. The female genitalia, mainly the shape of the ostium, put this species close to *palpalis* and its allies; however, its correct position cannot be ascertained until males are known.

DISTRIBUTION (Fig. 53). Brazil. The only specimen was collected in the lowlands on the coast of Santa Catarina, which is in Subtropical Moist Forest, transitional to Warm Temperate Moist Forest.

MATERIAL EXAMINED

Holotype ♀, Brazil: Santa Catarina (*Hoffmann*) (NMNH).

*Timocratica isarga* (Meyrick)

(Figs 53, 172)

*Stenoma isarga* Meyrick, 1925: 224. Holotype ♀, BOLIVIA (BMNH) [examined].

*Timocratica isarga* (Meyrick) Busck, 1935: 17 [catalogue]; Clarke, 1955: 388, pl. 194, figs 3-3c [adult, genitalia].

♀ 19 mm. Frons white. Basal half of second segment of labial palpus tinged with ochreous externally and with dark fuscous above, white internally; third segment dark fuscous with white scales basally. Fore coxa below and basal half of tibia above ochreous; fore femur above, distal half of tibia, and tarsus dark fuscous



with few white scales on articulations; articulations of mid femur, near tibia, tinged with golden-yellow. Fore wing with basal third of costa arched, distal two-thirds nearly straight; apex rounded, slightly angled, termen and tornus obliquely rounded;  $CuA_1$  and  $CuA_2$  shortly stalked; white below. Hind wing and abdomen white.

GENITALIA ♀ (Fig. 172). Margin of ostium bursae evenly concave. Antrum widened posteriorly, abruptly narrowed at middle, anterior half with margins nearly parallel, wrinkled longitudinally. Ductus bursae broadening progressively towards corpus bursae. Corpus bursae pear-shaped; walls, as in ductus bursae, plain. Signum an elongate plate without spines along middle.

REMARKS. *T. isarga* is very similar to *palpalis*, *melanocosta* and *nivea*, but is easily distinguished from the first by the stalked  $CuA_1$  and  $CuA_2$ , the plain white underside of the fore wings and white hind tarsi, and from the last two by the fuscous fore tarsi. The genitalia are very similar to those of *melanocosta* from which, however, it differs by the white costa of the fore wings. *T. nivea* has no yellow on the palpi and legs. Clarification of the relationship of *isarga* within the group depends upon the discovery of males.

DISTRIBUTION (Fig. 53). Bolivia (eastern side of the Andes); in Warm Temperate Moist Forest. According to Dr Holdridge (*in litt.*) this area is affected periodically by frost, resulting from cold air masses which come from Antarctica, and is colder than would be suggested by the mean annual temperature. According to the meteorological data it should be classified as Tropical Premontane Dry Forest, transitional to Subtropical Moist Forest.

MATERIAL EXAMINED

**Bolivia:** holotype ♀, Santa Cruz, Prov. del Sara, 450 m, xi (*Steinbach*) (BMNH).

*Timocratica albella* (Zeller)

(Figs 54, 75, 175)

*Depressaria (Volucra) albella* Zeller, 1839: 197. Holotype ♀, SURINAM (BMNH) [examined].  
*Cryptolechia albella* (Zeller) Zeller, 1854: 377 [redescription]; Walker, 1864: 713 [catalogue].  
*Timocratica albella* (Zeller) Busck, 1935: 16 [catalogue].

♀ 17 mm. Frons white. Second segment of labial palpus tinged with golden-yellow below, basal half tinged with fuscous above, white internally; third segment white externally, dark fuscous internally. Fore tarsus white above; fore coxa below, femur and basal half of tibia above golden-yellow, distal half of tibia, and tarsus dark fuscous below; mid and hind legs white. Fore wing with costa gently arched, apex right-angled, termen and tornus obliquely rounded; veins free; costa golden-yellow on underside. Hind wing white. Abdomen with second to fourth tergites tinged golden-yellow.

GENITALIA ♀ (Fig. 175). Ostium bursae wide, expanded posteriorly, concave at middle. Antrum very wide, funnel-shaped, anterior half with a few wrinkles. Ductus bursae broadening progressively towards corpus bursae, walls finely scobinate. Corpus bursae pear-shaped. Signum a long, transverse plate, concave across middle.

REMARKS. *T. albella* is very similar externally to *nivea* and *guarani*, but is easily distinguished from the former by the yellow tinge on its abdomen, fore legs, palpi and underside of the fore wing costa; from *guarani* it can be separated by the white head. The female genitalia are distinct from others in the group by the very broad antrum and the expansion of the margin of the ostium bursae. However, the relationship of this species within the group must remain unknown until males are discovered.

Although *albella* is known only from the holotype there are at least 50 references to it in the Brazilian literature; these are based on misidentifications, probably through following Bondar (1913) and Lima (1928; 1936; 1945), and most apply to *palpalis*.

DISTRIBUTION (Fig. 54). Surinam; probably from Paramaribo which is in Tropical Moist Forest.

MATERIAL EXAMINED

**Surinam:** holotype ♀, no further data (BMNH).

*Timocratica guarani* sp. n.

(Figs 54, 76, 142, 143)

♂ 12–14 mm. Frons white, edged with fuscous and few ochreous scales. Basal two-thirds of second segment of labial palpus ochreous externally, dark grey above, distal third and internally white; third segment dark fuscous with white scales basally. Fore coxa, femur and tibia ochreous below; distal half of tibia, and tarsus white above, dark fuscous below; distal articulations of mid and hind femora tinged with golden-ochreous. Fore wing with costa gently arched, apex somewhat angled, termen and tornus obliquely rounded; veins free,  $CuA_1$  and  $CuA_2$  very close basally in some specimens; underside golden-ochreous above cell. Hind wing white. Abdomen slightly tinged with cream-yellow dorsally.

GENITALIA ♂ (Figs 142, 143). Uncus with lateral margins nearly parallel, apical third with long sparse setae in some specimens, apex strongly concave. Apex of gnathos broadly rounded. Digitate processes of juxta with basal half broad, distal half narrow, covered with long sparse setae. Basal half of valva with margins nearly parallel, then narrowing progressively towards apex, sacculus slightly expanded. Aedeagus bent basally, vesica with strong bent cornutus and many acute spines of different sizes opposite.

REMARKS. *T. guarani* is externally very similar to *albella*, but their relationship cannot be clarified until males of the latter are discovered. It differs from other white species from southern South America by the white fore tarsi and yellow-tinged abdomen, and from *albella* by having the frons edged with fuscous.

DISTRIBUTION (Fig. 54). Northern Argentina and Paraguay. It appears that this is the only species restricted to Warm Temperate Dry Forest. The only other species recorded from the same region is *palpalis* (collected by Hayward in Villa Ana) which, however, is not restricted to it.

## MATERIAL EXAMINED

3 ♂ (2 genitalia preparations).

Holotype ♂, Argentina: Santa Fé, Villa Guillermina, 20. ii.1925 (Hayward) (BMNH).

Paratypes. Argentina: 1 ♂, Santa Fé, Villa Ana, ii.1924 (Hayward) (BMNH). Paraguay: 1 ♂, Paraguay Central, 1885 (Germain) (BMNH).

*Timocratica philomela* (Meyrick)

(Figs 54, 146, 147)

*Stenoma philomela* Meyrick, 1925: 224. Holotype ♂, PERU (BMNH) [examined].

*Timocratica philomela* (Meyrick) Busck, 1935: 17 [catalogue]; Clarke, 1955: 391, pl. 195, figs 3–3b [adult, genitalia].

♂ 10 mm. Head white, edged with fuscous. Second segment of labial palpus ochreous below, basal two-thirds dark fuscous above, distal third above and internally white; third segment white, fuscous towards apex. Antenna fuscous, scape white. Fore coxa below, femur and basal half of tibia above, and tarsus dark fuscous. Hind tarsus golden-ochreous. Fore wing with costa gently arched, apex, termen and tornus evenly rounded; veins free; underside golden-yellow, slightly tinged with fuscous along apex. Hind wing tinged with cream-yellow. Abdomen white.

GENITALIA ♂ (Figs 146, 147). Uncus wide, basal half slightly constricted; apex strongly concave. Apex of gnathos wide, triangular. Digitate processes of juxta long, broadened basally, narrowing progressively towards apex, few setae at distal half dorsally. Valva slightly constricted basally, dorsal margin nearly straight, ventral margin evenly rounded. Aedeagus bent ventrad, vesica with strong bent cornutus and many spines opposite.

REMARKS. *T. philomela* is a small species similar to *butyrota* and *parvileuca* but is easily distinguished by the ochreous colour of the labial palpi.

DISTRIBUTION (Fig. 54). Peru (Amazonian side of the Andes), in Tropical Moist Forest.

## MATERIAL EXAMINED

Peru: holotype ♂, Loreto, Yurimaguas, iii.1920 (Parish) (BMNH).

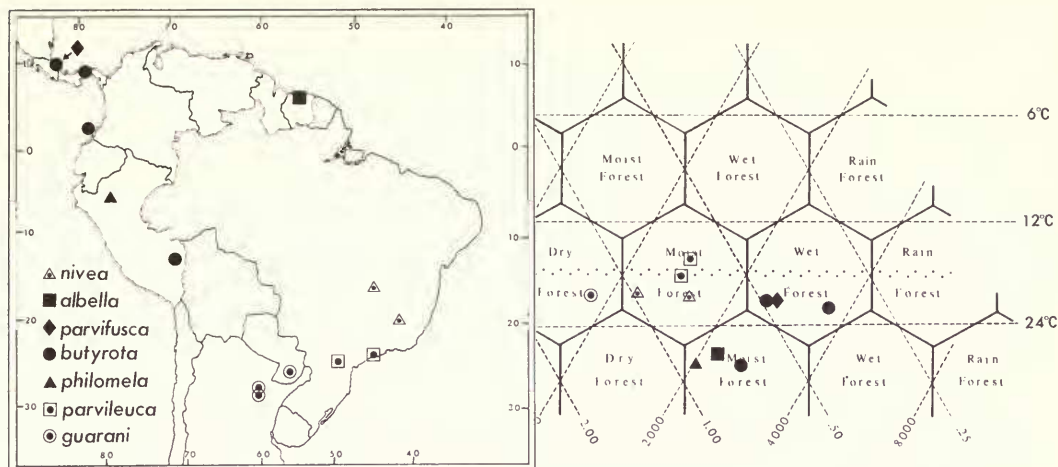


Fig. 54 Geographical and ecological distribution of the *albella*-group of *Timocratica*.

*Timocratica parvileuca* sp. n.

(Figs 54, 150, 151)

♂ 9–10 mm. Frons white, edged with fuscous. Second segment of labial palpus fuscous, white internally; third segment white, few fuscous scales internally towards apex. Antenna cream-yellow, scape white. Thorax cream-yellow. Fore coxa tinged with fuscous below; femur and tibia above, and tarsus dark fuscous; mid and hind legs light golden-yellow. Fore wings sub-oval, costa gently arched, apex, termen and tornus evenly rounded; veins free; golden-yellow below. Hind wing and abdomen cream-yellow.

GENITALIA ♂ (Figs 150, 151). Uncus narrow, basal half slightly broadened. Apex of gnathos long, narrow. Digitate processes of juxta long, narrow, distal half with several setae dorsally. Valva with margins nearly parallel or somewhat broadened at middle, dorsal margin nearly straight or somewhat bent basally, ventral margin evenly rounded. Aedeagus strongly bent ventrad, vesica with strong short cornutus and many small spines.

REMARKS. *T. parvileuca* is one of the smallest species in the genus; it is very similar to *butyrota* and *philomela*, but is easily distinguished from the former by the numerous spines of the vesica, and from the latter by the lack of ochreous coloration of the palpi. Although it is closest to *butyrota* it seems to vary less in wing venation.

DISTRIBUTION (Fig. 54). Brazil (Plateau of Paraná and São Paulo), in Subtropical Lower Montane Forest, a different Life Zone from that of its nearest related species, *butyrota*.

MATERIAL EXAMINED

4 ♂ (2 genitalia preparations).

Holotype ♂, **Brazil**: São Paulo, São Paulo (*Jones*) (BMNH).

Paratypes. **Brazil**: 2 ♂, São Paulo, São Paulo (*Jones*) (BMNH); 1 ♂, Paraná, Castro (*Jones*) (BMNH).

*Timocratica butyrota* (Meyrick) comb. n.

(Figs 16–19, 54, 74, 148, 149, 178)

*Stenoma butyrota* Meyrick, 1929: 516; Busck, 1935: 35 [catalogue]; Clarke, 1955: 276, pl. 138, figs 1–1c [adult, genitalia]. Holotype ♂, COLOMBIA (BMNH) [examined].

*Stenoma syndicastis* Meyrick, 1929: 516; Busck, 1935: 58 [catalogue]. Holotype ♂, COLOMBIA (BMNH) [examined]. **Syn. n.**

*Timocratica syndicastis* (Meyrick) Clarke, 1955: 392, pl. 196, figs 1–1b [adult, genitalia].

♂ 9–13 mm, ♀ 14–17 mm. Frons white, edged with fuscous. Second segment of labial palpus dark fuscous, white internally and at distal articulation; third segment white in males, dark fuscous in females. Antenna fuscous, scape white. Fore coxa fuscous below, femora and basal half of tibia golden-ochreous above, distal half of tibia, and tarsus dark fuscous; mid leg golden-yellow above; hind tarsus golden-yellow. Fore wing sub-oval, costa rounded, apex, termen and tornus evenly rounded; veins free or  $R_4$  and  $R_5$ , and  $CuA_1$  and  $CuA_2$ , stalked or connate; underside golden-yellow, fuscous or white along apex and termen. Hind wing tinged with cream-yellow. Second to sixth abdominal tergites cream-yellow.

GENITALIA ♂ (Figs 148, 149). Lateral margins of uncus nearly parallel or slightly convergent towards apex; apex slightly concave to slightly convex. Apex of gnathos narrow. Digitate processes of juxta short, laterally compressed, with short setae dorsally. Valva with margins nearly parallel, evenly rounded, or broadened at middle; ampulla slightly pronounced. Aedeagus bent ventrad, vesica with strong, short cornutus.

GENITALIA ♀ (Fig. 178). Margin of ostium bursae straight or slightly convex. Antrum wide, short, with few wrinkles anteriorly. Ductus and corpus bursae not differentiated, forming a long, wide sac. Signum a long, irregular plate.

REMARKS. *T. butyrota* is very similar to *philomela* and *parvileuca*, but is easily distinguished from the former by the lack of ochreous coloration on the palpi, and from the latter by the absence of spines in the vesica.

The venation of the fore wing is very variable in this species, as it is in *nivea*. Some specimens have all the veins free, others have  $R_4$  and  $R_5$ , and  $CuA_1$  and  $CuA_2$ , connate or stalked, and some have  $R_4$  and  $R_5$  stalked very close to the apex (Figs 16–19). These two veins can be completely fused, and this is the case in the holotype of *syndicastis*, which has only eleven veins in the fore wing. Variation occurs even within the same locality, and in a large series from Turrialba, Costa Rica, specimens with all the above combinations were found.

The absence of a differentiated ductus bursae in this species is unique within the genus.

DISTRIBUTION (Fig. 54). Costa Rica, Colombia and Peru. No climatic data could be obtained for Gorgona I., the type-locality, to establish the Life Zone. However, as suggested by other localities it is probably Tropical Moist Forest or Tropical Premontane Wet Forest.

#### MATERIAL EXAMINED

71 ♂, 10 ♀ (8 ♂, 2 ♀ genitalia preparations).

**Colombia:** holotype ♂ of *S. butyrota*, Cauca, Gorgona I., 60 m ('200 ft'), 7.x.1924 (*Collenette*) (BMNH); holotype ♂ of *S. syndicastis*, Cauca, Gorgona I., 60 m ('200 ft'), 7.vii.1924 (*Collenette*) (BMNH). **Costa Rica:** 61 ♂, 10 ♀, Cartago, Turrialba, 600 m, 6–15.vii, 10.xi.1971; 10.ii, 4–20.v.1972; 10–20.iv.1973 (*Becker*) (VB; BMNH; LN; MNHU; NM; NMNH; ZS3S). **Panama:** 5 ♂, Canal Zone, Barro Colorado I., 10.x–12.xii.1934 (*Bates*) (NMNH). **Peru:** 1 ♂, Puno, Carabaya, La Oroya, Rio Inambari, 1000 m ('3100 ft'), iii.1905 (*Ockenden*) (BMNH).

#### *Timocratica parvifusca* sp. n.

(Figs 20, 54, 67, 152, 153)

♂ 9 mm. Head fuscous. Second segment of labial palpus dark fuscous with dark grey scales externally, whitish internally; third segment light fuscous, whitish basally. Antenna dark fuscous. Thorax dark fuscous. Fore coxa and femora light fuscous, fore tibia and tarsus dark fuscous; mid tibia and tarsus ochreous; tarsi tinged with fuscous distally. Fore wing nearly oval; apex, termen and tornus evenly rounded; veins  $R_4$  and  $R_5$ ,  $CuA_1$  and  $CuA_2$  stalked,  $M_1$  missing; dark fuscous, costa ochreous below. Abdomen fuscous above, whitish below.

GENITALIA ♂ (Figs 152, 153). Uncus broad, lateral margins nearly parallel, slightly broadened at middle. Apex of gnathos long, narrow, pointed. Digitate processes of juxta slightly broadened at middle, gently curved dorsad. Aedeagus strongly curved ventrad, vesica with long curved cornutus.

REMARKS. *T. parvifusca* is similar externally to *fraternella*, but differs by its smaller size, stalked  $R_4$  and  $R_5$ , and the lack of  $M_1$  and the oblique fasciae of the fore wings.

Despite its colour pattern, which does not agree with that of any species of the *albella*-group, there is no doubt that it belongs here. The shape of the genitalia and wings, and the venation, as well as its geographical and ecological distribution, indicate that it is very close to if not a melanic form of *butyrota*.

DISTRIBUTION (Fig. 54). Costa Rica, in Tropical Premontane Wet Forest.

MATERIAL EXAMINED

Holotype ♂, Costa Rica: Cartago, Turrialba, 600 m, 5.vii.1971 (*Becker*) (BMNH).

### Species transferred from *Timocratica*

The following species have been included in *Timocratica* but are here transferred provisionally to *Stenoma*, although none of them seem to be congeneric with *litura* Zeller, the type-species, which is represented only by the holotype ♀ in the BMNH. Since the characters of female Stenominae are inadequate for generic divisions, the relationship of *litura* with other species in the subfamily cannot be established. It is probably congeneric with *griseana* Fabricius, the type-species of *Antaeotricha* Zeller. If this proves true, most of the species now in *Antaeotricha* should be referred to *Stenoma*, and most of the species now in *Stenoma* should be transferred to other genera, most of these still to be defined. This would involve more than 1000 new combinations. The decision to synonymize *Antaeotricha* with *Stenoma*, and the erection of new genera to accommodate species now in this genus, should be taken only after further research, and possibly not before the male of *litura* is known.

#### *Stenoma completella* (Walker)

*Cryptolechia completella* Walker, 1864: 718. LECTOTYPE ♀, BRAZIL: Amazonas, Tefé ['Ega'] (*Bates*) (BMNH), here designated [examined].

*Timocratica completella* (Walker) Busck, 1935: 16.

*Stenoma completella* (Walker) Duckworth, 1962: 113.

As the abdomen of the male syntype is lost, the female syntype is here selected as the lectotype; the male is labelled paralectotype. This species is very similar externally to *Antaeotricha rhipidaula* (Meyrick).

The larvae of *completella*, unlike those of *Timocratica*, skeletonize leaves tied together with silk; I have reared a specimen from a larva feeding on *Brosimum costaricanum* (Moraceae) in Costa Rica.

#### *Stenoma convexicostata* (Zeller) comb. n.

*Cryptolechia convexicostata* Zeller, 1877: 272. Holotype ♀ [not ♂ as stated by Zeller], BRAZIL: Rio de Janeiro, Nova Friburgo (MNHU) [examined].

*Stenoma liniella* Busck, 1910: 80. Holotype ♂, COSTA RICA: Sixaola River (*Schaus*) (NMNH) [not examined].

**Syn. n.**

*Stenoma cantatrix* Meyrick, 1925: 221. Holotype ♂, BOLIVIA: Santa Cruz, Prov. del Sara, 450 m, x (*Steinbach*) (BMNH) [examined]. **Syn. n.**

*Timocratica cantatrix* (Meyrick) Clarke, 1955: 387.

*Timocratica liniella* (Busck) Duckworth, 1962: 113.

The holotypes of *convexicostata* and *cantatrix*, and a paratype of *liniella* in the BMNH, have been examined and there is little doubt that they represent the same species, which is distributed from the gulf area of Mexico to south Brazil. The specimens examined show some variation in colour, some being darker than others, and in the female genitalia. However, the male genitalia are almost identical in specimens from different localities and of different colour-pattern.

Duckworth (1962: 113) pointed out that the genitalia of *liniella* and *cantatrix* are atypical for *Timocratica* and that both might require a new genus.

#### *Stenoma grandaeva* (Zeller) comb. n.

*Cryptolechia grandaeva* Zeller, 1854: 381. Holotype ♀, BRAZIL [no further data] (MNHU) [examined].

*Stenoma chrysoastra* Meyrick, 1915: 476. Holotype ♂, FRENCH GUIANA: St Jean du Maroni, 1915 (*Le Mout*) (BMNH) [examined]. **Syn. n.**

*Timocratica grandaeva* (Zeller) Busck, 1935: 16.

Although the holotype of *grandaeva* is in quite poor condition, with the abdomen, part of the antennae and most of the legs missing, there is no doubt that it is conspecific with the holotype of *chrysogastra*.

***Stenoma sexmaculata* (Dognin) comb. n.**

*Cryptolechia sexmaculata* Dognin, 1904: 133. Holotype ♀, ECUADOR: San Francisco, near Loja (NMNH) [examined].

*Timocratica sexmaculata* (Dognin) Busck, 1935: 17.

Although this species has the ground colour of the fore wing white, the metallic blue-green dots, as well as its genitalia, are atypical of *Timocratica*.

***Stenoma staudingerana* (Maassen) comb. n.**

*Tortrix staudingerana* Maassen, 1890: 25, pl. 9, fig. 29. Holotype [♂?], COLOMBIA: Villavicencio [not examined].

*Stenoma contophora* Meyrick, 1915: 472. Lectotype ♂, FRENCH GUIANA: Godebert, R. Maroni, 1915 (*Le Moulte*) (BMNH) [examined]. **Syn. n.**

*Stenoma heterosema* Meyrick, 1930: 244. Holotype ♂, BRAZIL: Pará, Taperinha, 21–30.vi.1927 (*Zerny*) (NM) [examined]. **Syn. n.**

*Timocratica staudingerana* (Maassen) Busck, 1935: 17.

According to Horn & Kahle (1935: 162, 272) the Stübel collection, including the Maassen types, was deposited in the MNHU. Dr H.-J. Hannemann was unable to find the holotype of *staudingerana* there (pers. comm.), neither is it in the IP (Dr Gaedike, pers. comm.). However, from the excellent illustration which accompanies the description, there is no doubt that *staudingerana* represents the species described later by Meyrick as *contophora* and *heterosema*. It is widely distributed in South America; in the BMNH there are specimens from Bolivia, Brazil, Peru, French Guiana and Surinam.

The genitalia of *staudingerana* exclude this species from *Timocratica*.

***Stenoma tristrigata* (Zeller) comb. n.**

*Cryptolechia tristrigata* Zeller, 1854: 382, pl. 3, fig. 21. Holotype ♀, BRAZIL [no further data] (MNHU) [examined].

*Stenoma aphanodesma* Meyrick, 1915: 478. Holotype ♂, FRENCH GUIANA: Godebert, R. Maroni, 1915 (*Le Moulte*) (BMNH) [examined]. [Synonymized by Busck, 1935: 17.]

?*Timocratica tristrigata* (Zeller) Meyrick, 1912: 706; Busck, 1935: 17; Clarke, 1955: 392, pl. 196, figs 2, 2a.

Although the holotypes are of different sex there is no doubt that they belong to the same species.

The male genitalia of *tristrigata* are similar to those of *staudingerana*, and exclude both species from *Timocratica*.

### Acknowledgements

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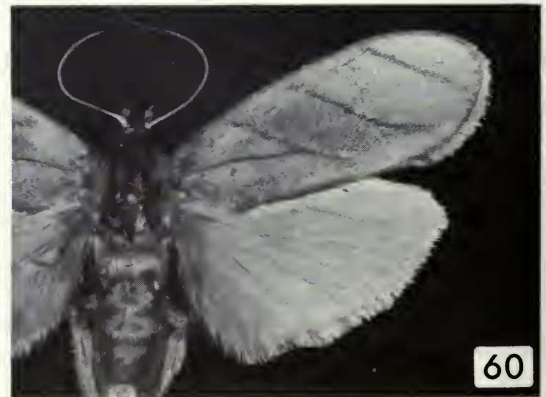
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Figs 55–60 Wings of *Timocratica* species. 55, *T. agramma* sp. n., holotype ♂, Brazil. 56, *T. longicilia* sp. n., holotype ♂, Colombia. 57, *T. pompeiana* Meyrick, ♂, Peru. 58, *T. monotonia* (Strand), ♂, Venezuela. 59, *T. meridionalis* sp. n., holotype ♂, Brazil. 60, *T. loxotoma* (Busck), ♂, Mexico.



**Figs 61–66** Wings of *Timocratica* species. 61, *T. fraternella* (Busck), ♂, Costa Rica. 62, *T. species 1*, ♀, Costa Rica. 63, *T. major* (Busck), ♀, Brazil. 64, *T. effluxa* (Meyrick), holotype ♂, Bolivia. 65, *T. species 2*, ♂, Peru. 66, *T. leucocapna* (Meyrick), holotype ♂, Colombia.



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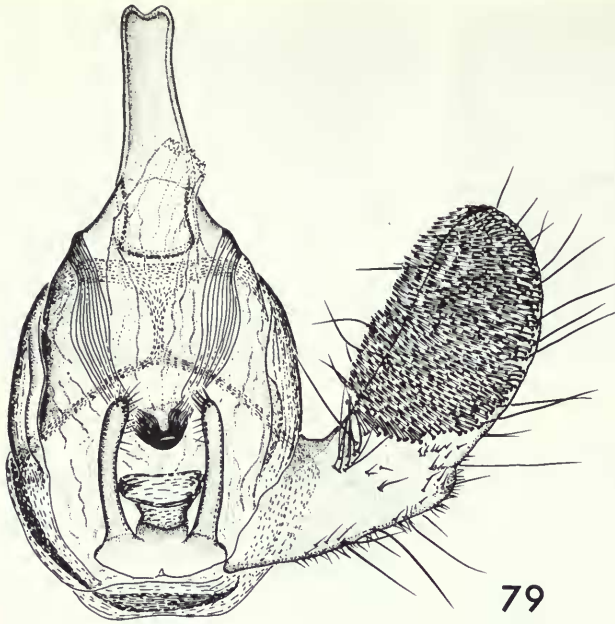


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Figs 67–72 Wings of *Timocratica* species. 67, *T. parvifusca* sp. n., holotype ♂, Costa Rica. 68, *T. melanostriga* sp. n., holotype ♀, Brazil. 69, *T. grandis* (Perty), ♀, French Guiana. 70, *T. xanthotarsa* sp. n., holotype ♂, Panama. 71, *T. anelaea* (Meyrick), ♂, Brazil. 72, *T. macroleuca* (Meyrick), ♂, Bolivia.



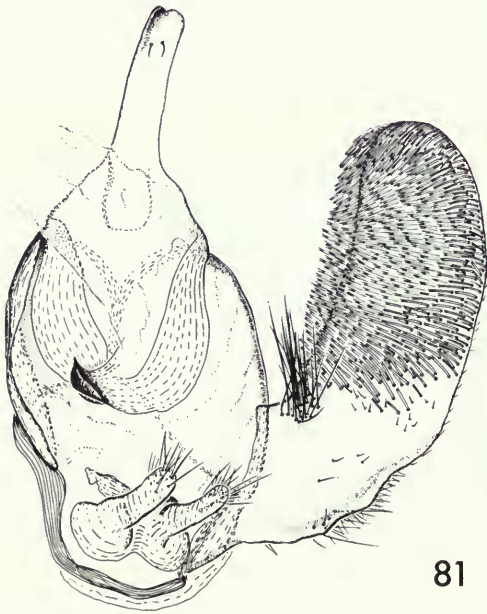
**Figs 73–78** Wings of *Timocratica* species. 73, *T. titanoleuca* sp. n., holotype ♂, Peru. 74, *T. butyrota* (Meyrick), ♂, Costa Rica. 75, *T. albella* (Zeller), holotype ♀, Surinam. 76, *T. guarani* sp. n., holotype ♂, Argentina. 77, *T. xanthosoma leucocephala* subsp. n., holotype ♂, Panama. 78, *T. venifurcata* sp. n., holotype ♂, Brazil.



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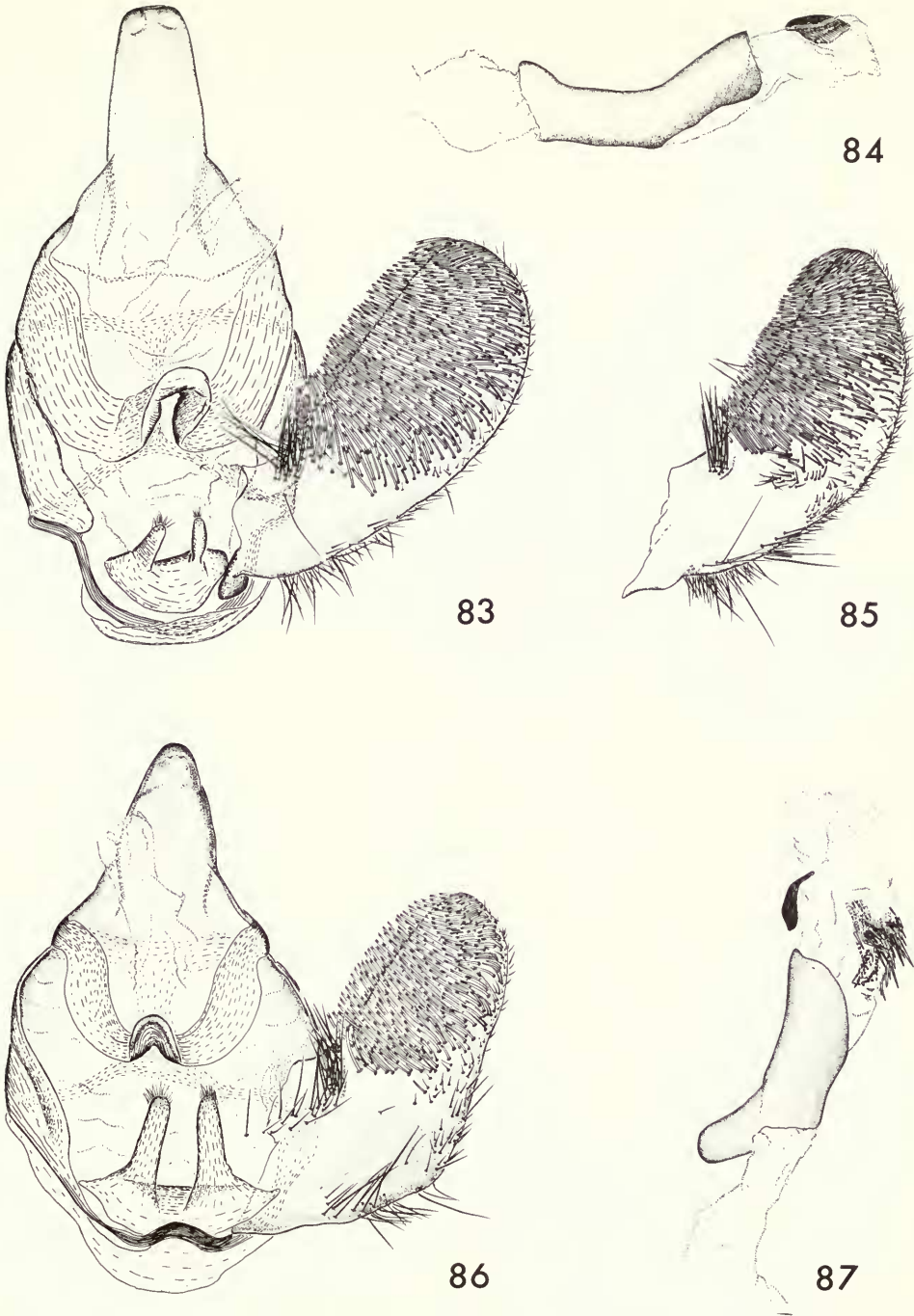


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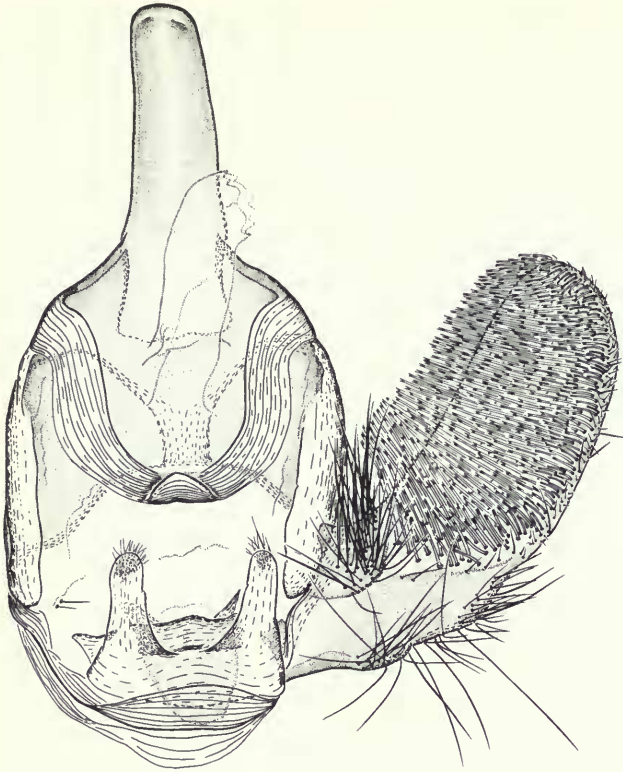


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Figs 79–82 Genitalia of *Timocratica* ♂. 79, 80, *T. major* (Busck), Brazil. 81, 82, *T. agramma* sp. n., holotype, Brazil.



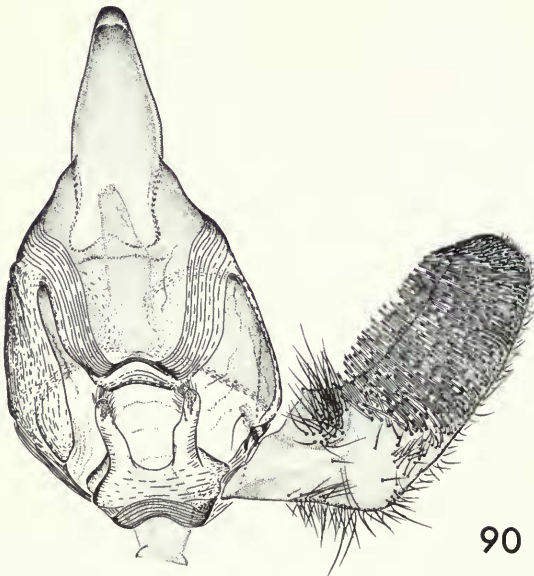
Figs 83–87 Genitalia of *Timocratica* ♂. 83–85, *T. longicilia* sp. n. (83, 84) paratype, Colombia. (85) right valva, paratype, Colombia. 86, 87, *T. pompeiana* Meyrick, Peru.



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Figs 88-91 Genitalia of *Timocratica monotonia* (Strand), ♂. 88, 89, Colombia. 90, 91, Brazil.





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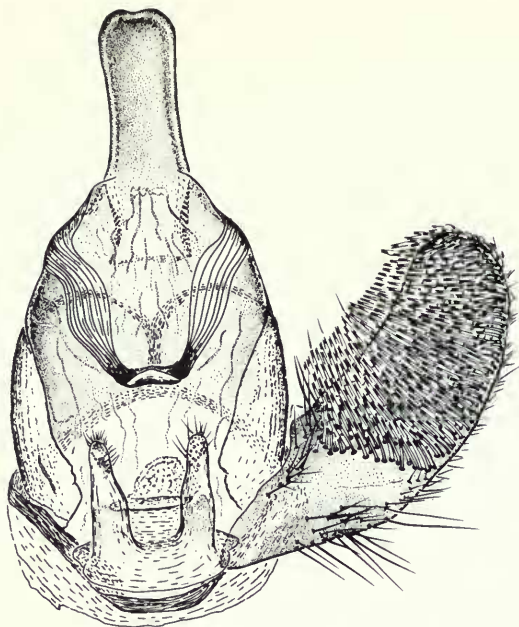


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**Figs 92–95** Genitalia of *Timocratica* ♂. 92, 93, *T. monotonia* (Strand), Venezuela. 94, 95, *T. meridionalis* sp. n., paratype, Brazil.



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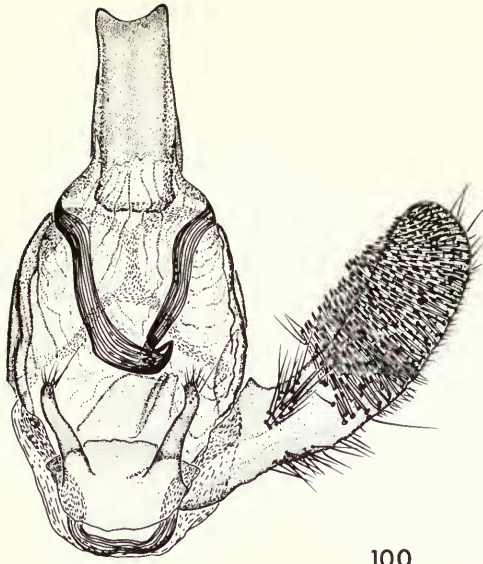


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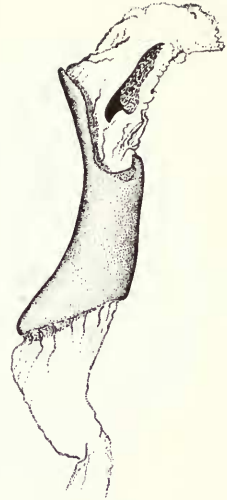


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Figs 96-99 Genitalia of *Timocratica* ♂. 96, 97, *T. loxotoma* (Busck), Mexico. 98, 99, *T. fraternella* (Busck), Costa Rica.



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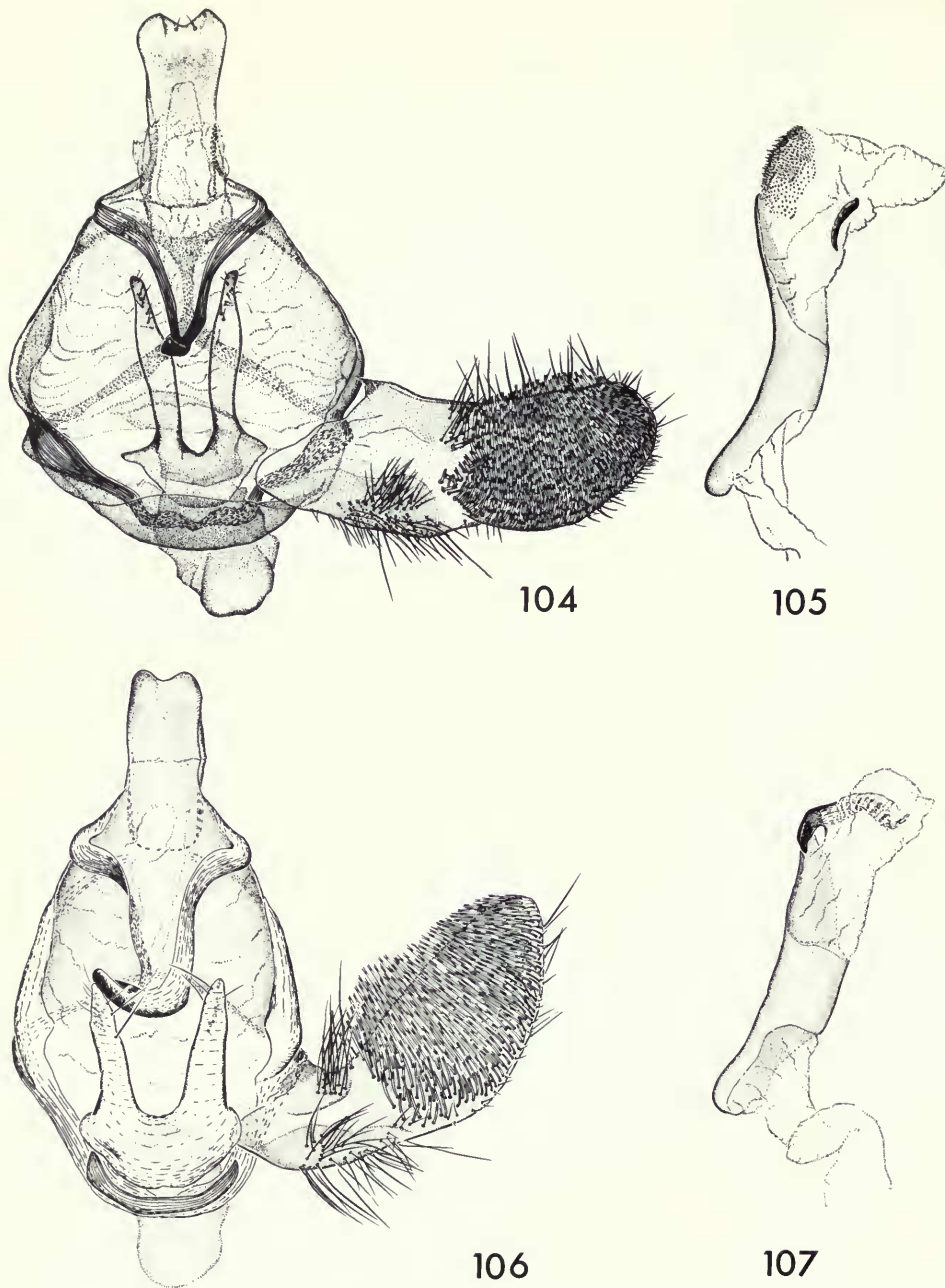


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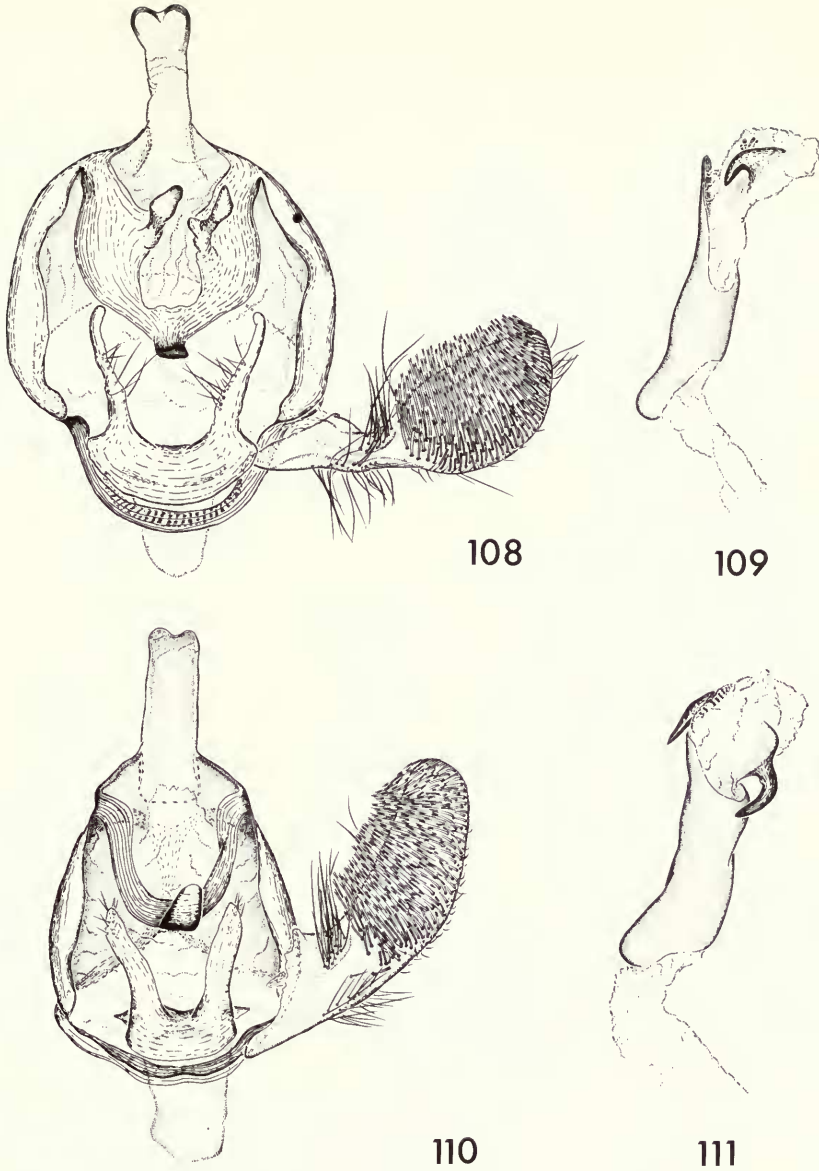


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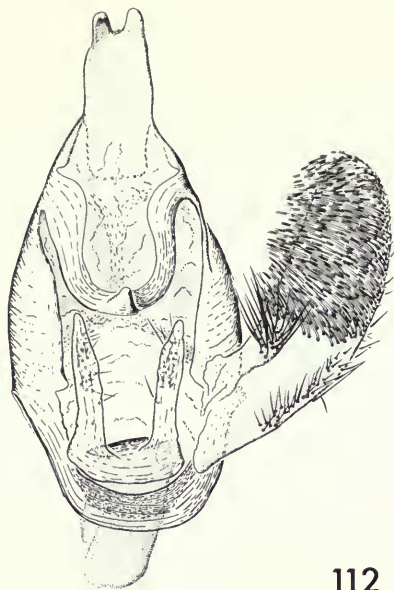
**Figs 100–103** Genitalia of *Timocratica* ♂. 100, 101, *T. leucocapna* (Meyrick), Costa Rica. 102, 103, *T. effluxa* (Meyrick), holotype, Bolivia.



Figs 104–107 Genitalia of *Timocratica* ♂. 104, 105, *T. grandis* (Perty), Panama. 106, 107, *T. xanthotarsa* sp. n., paratype, Panama.



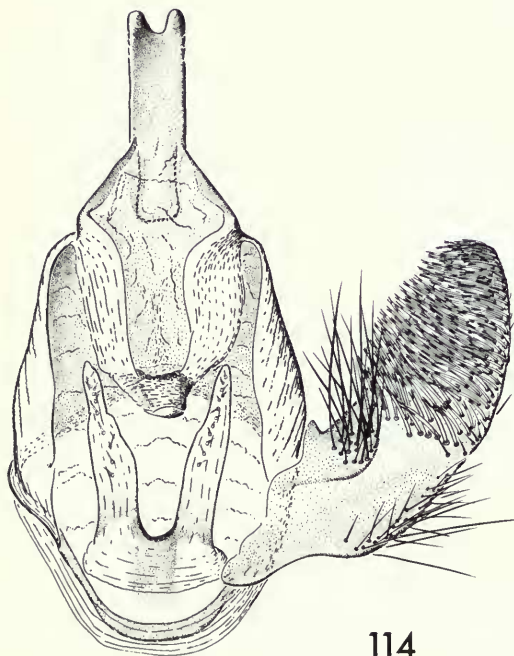
**Figs 108–111** Genitalia of *Timocratica* ♂. 108, 109, *T. constrictivalva* sp. n., holotype, Ecuador. 110, 111, *T. bicornuta* sp. n., paratype, Brazil.



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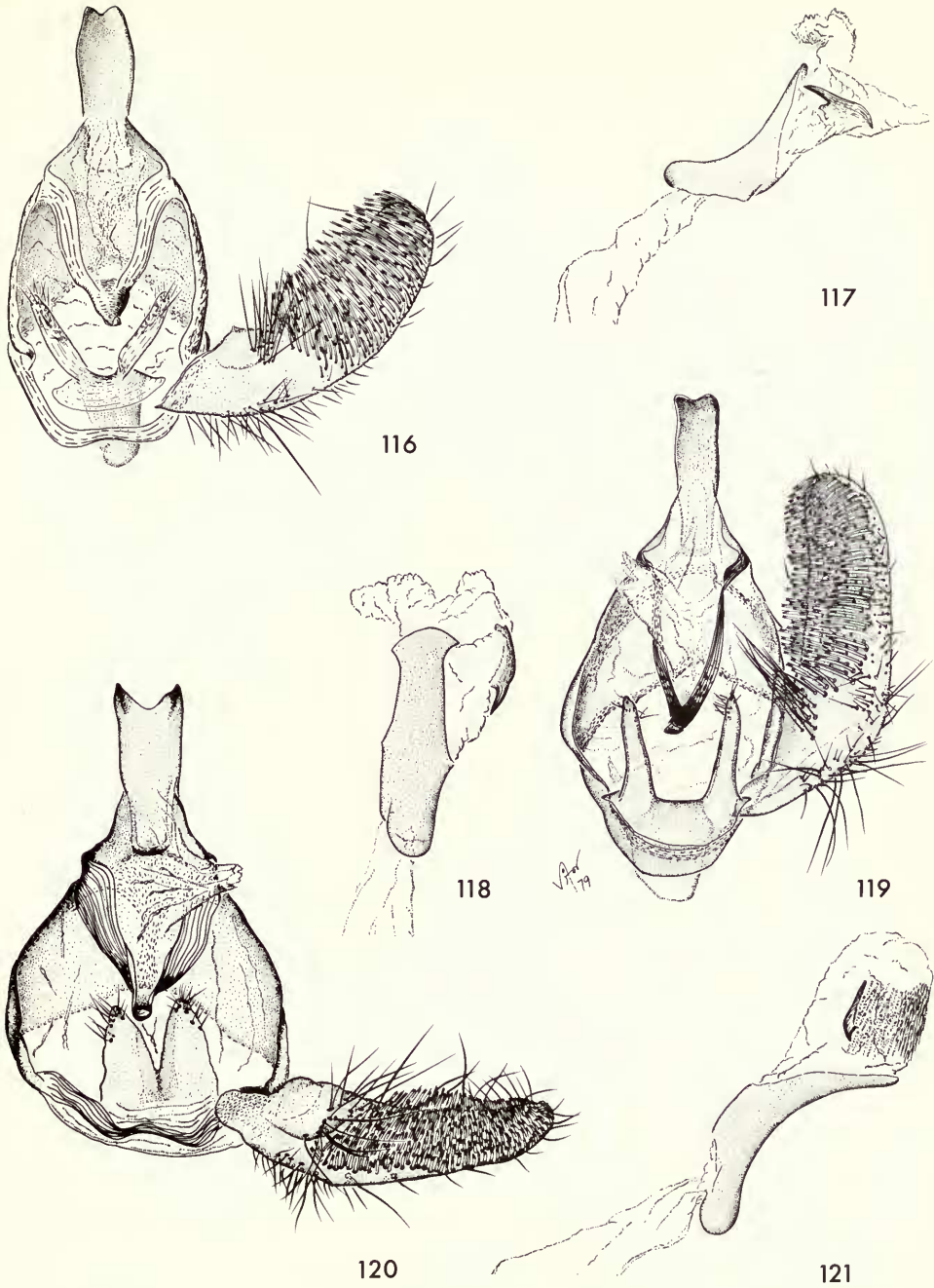


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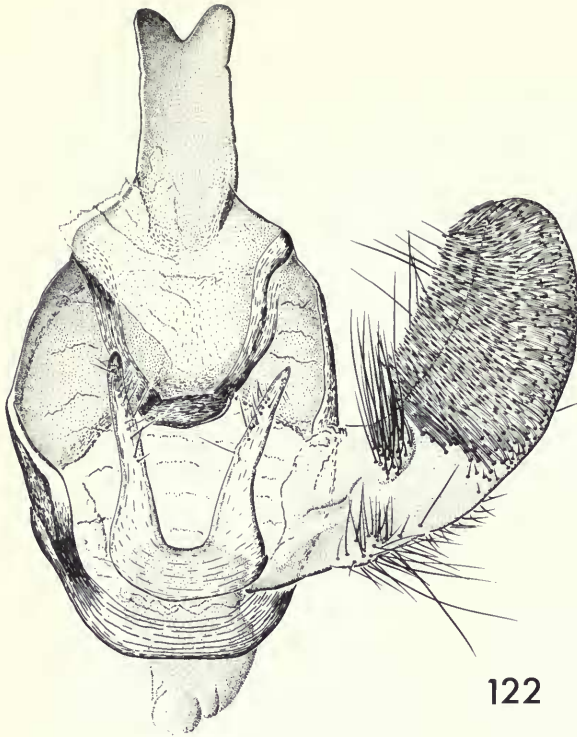


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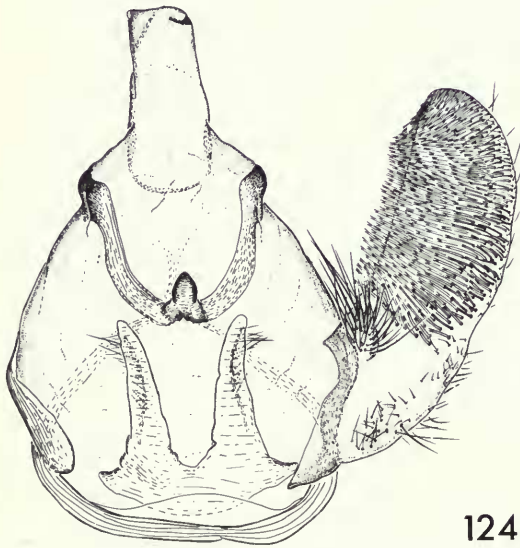
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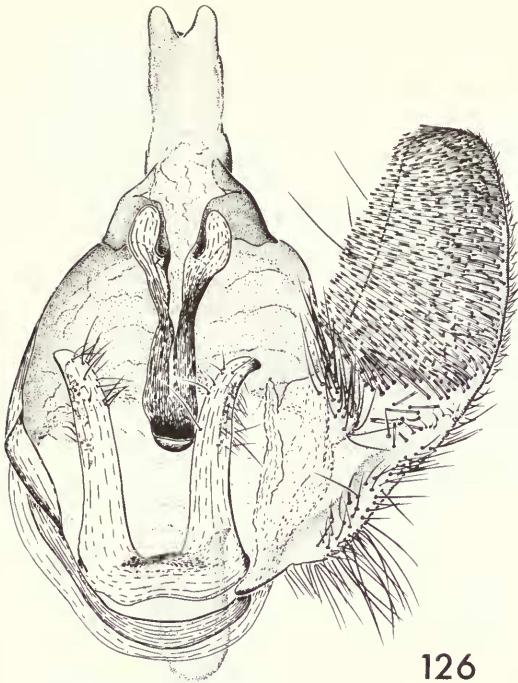
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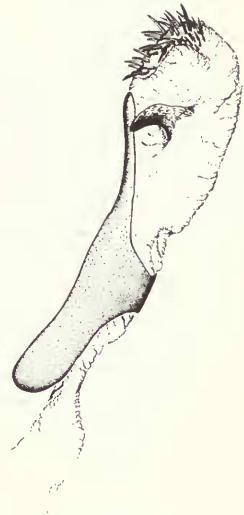
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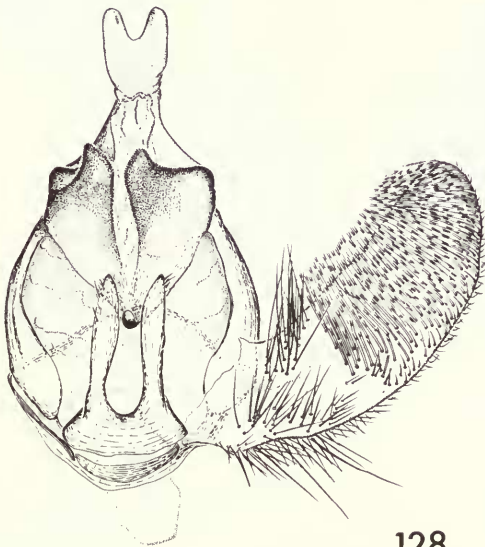




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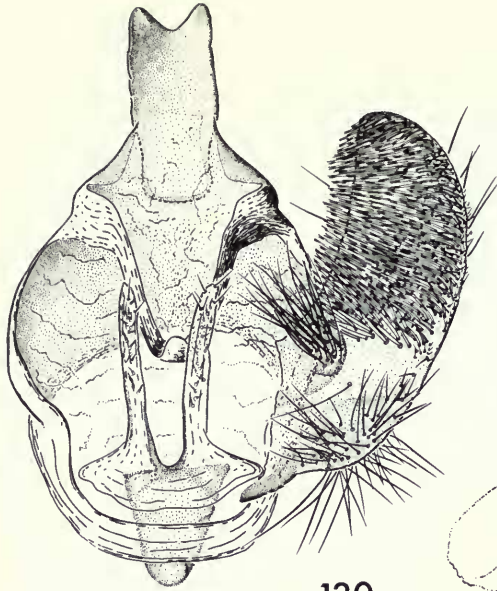


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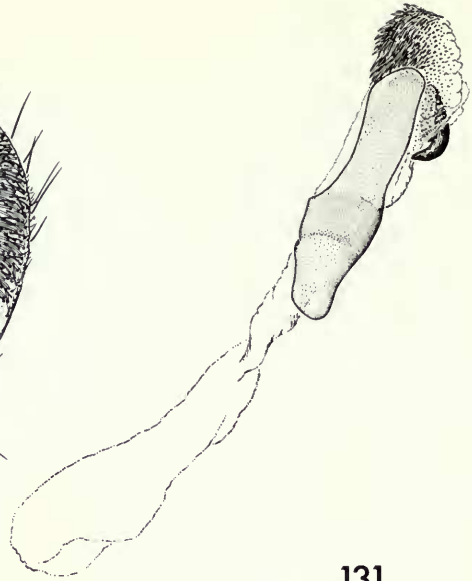


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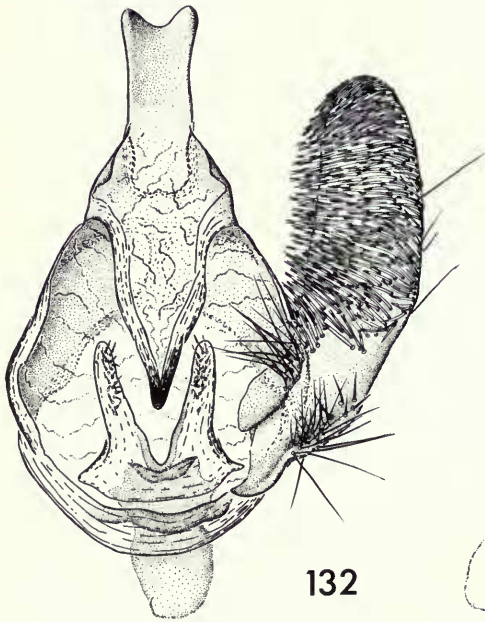
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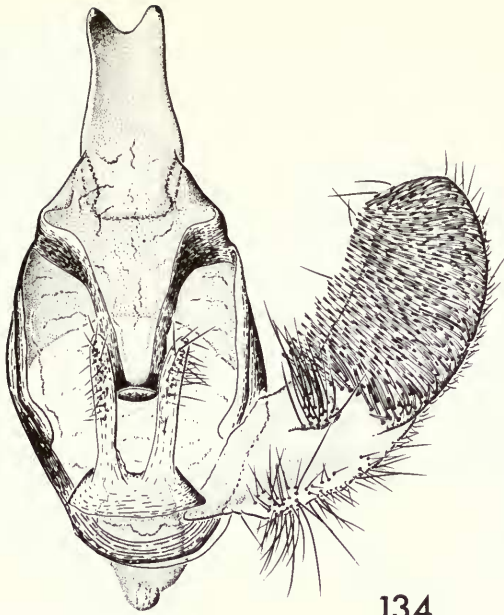


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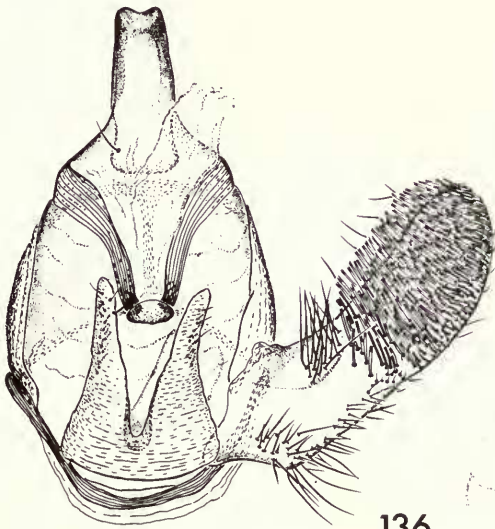
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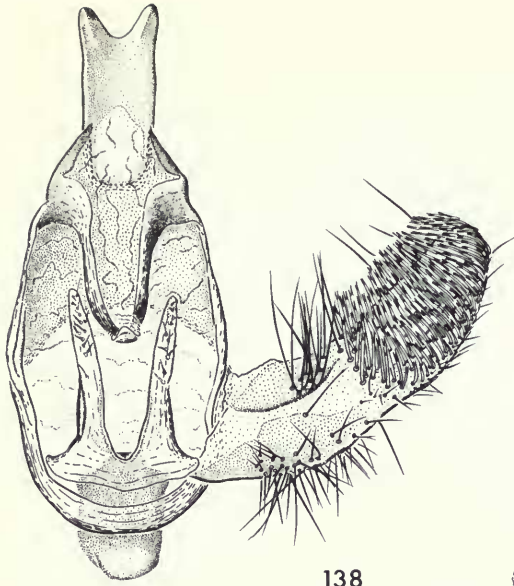


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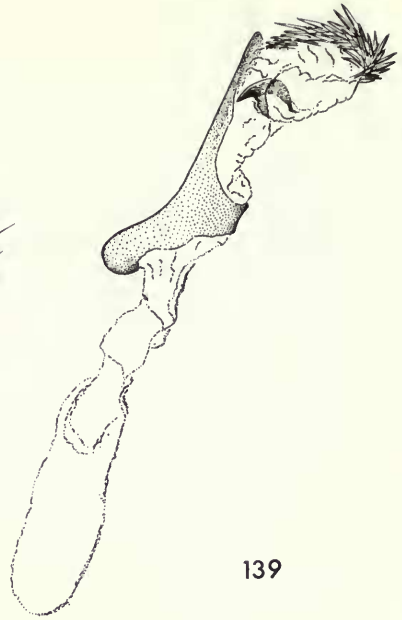


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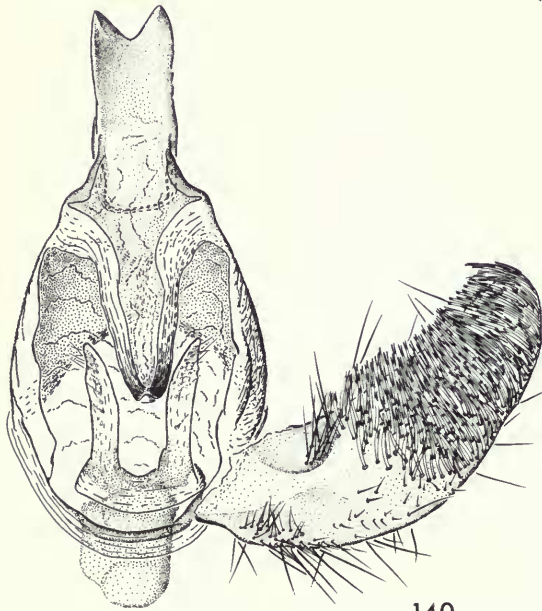
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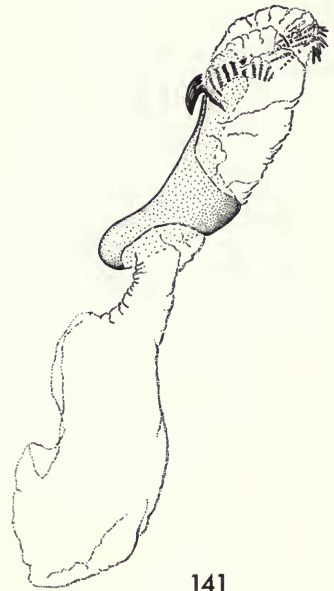
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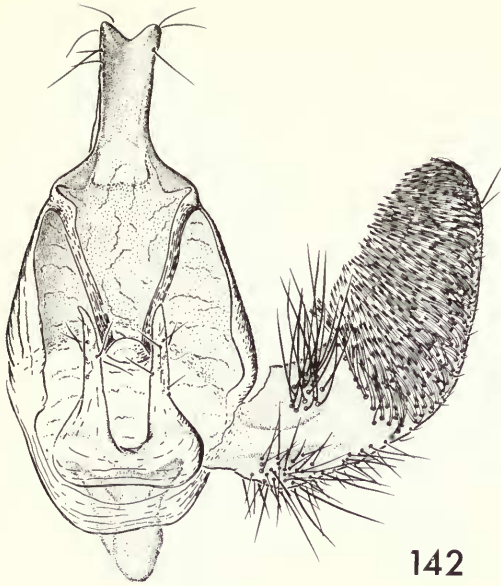


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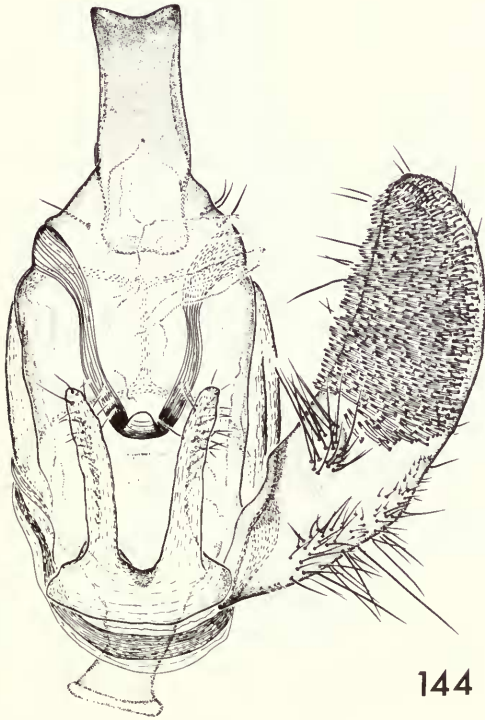
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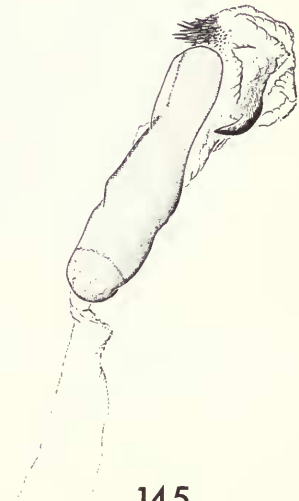
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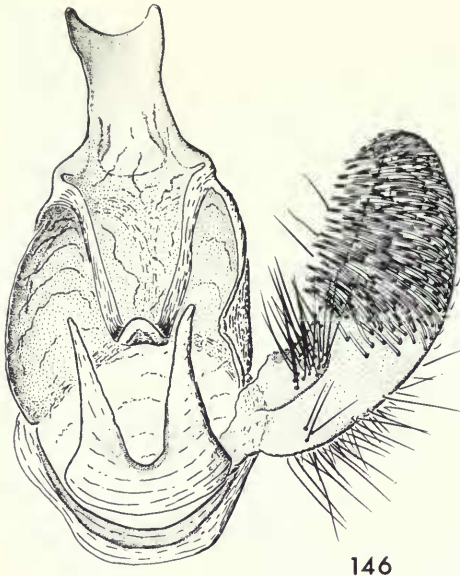


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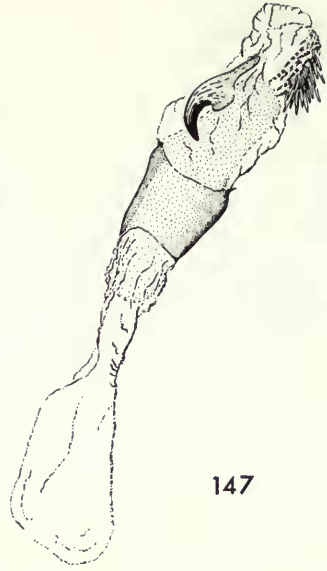


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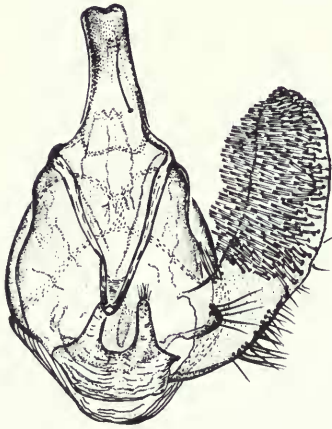
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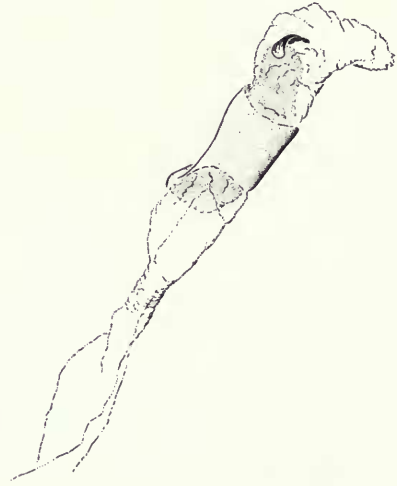
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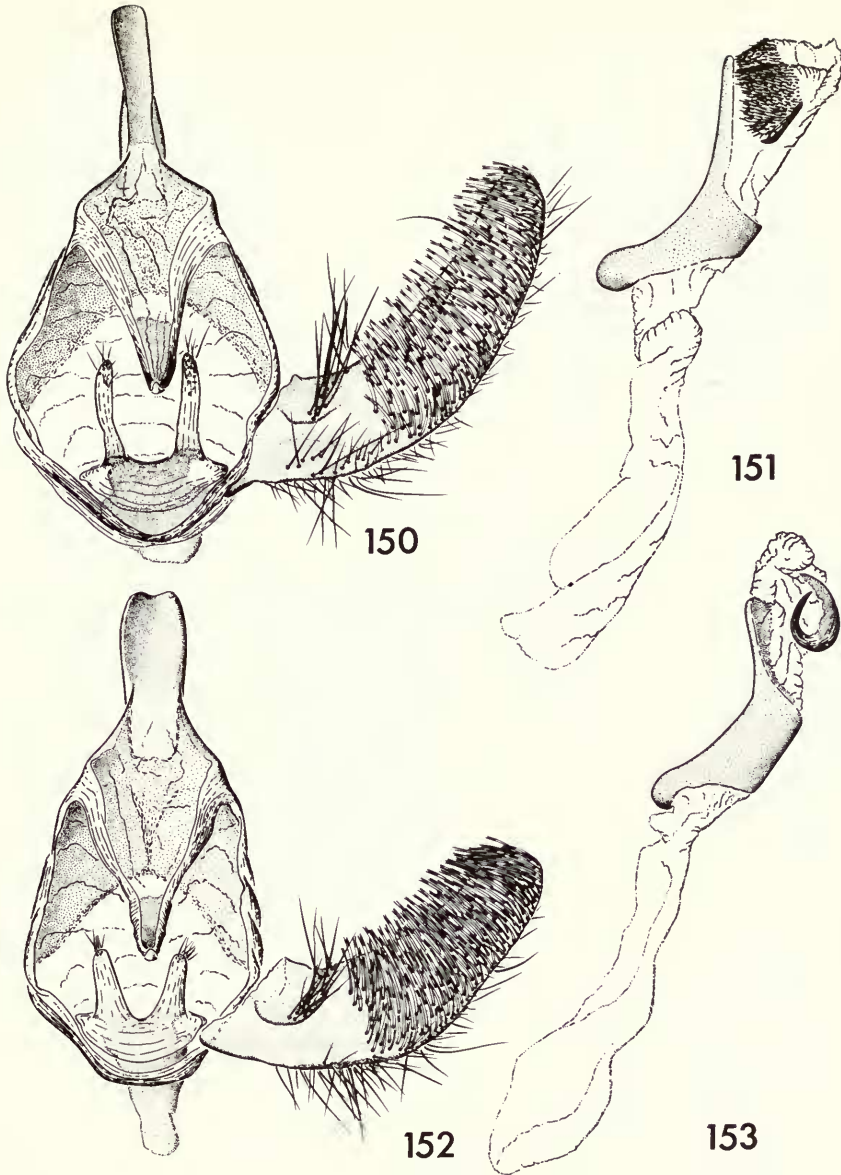


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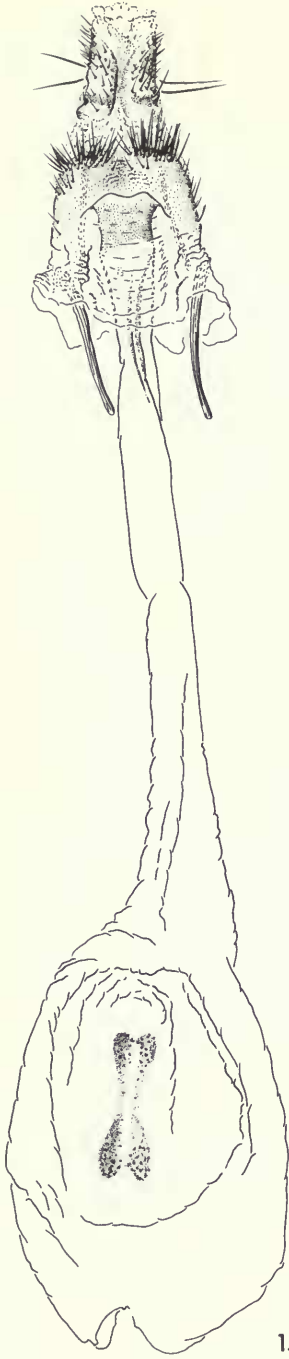


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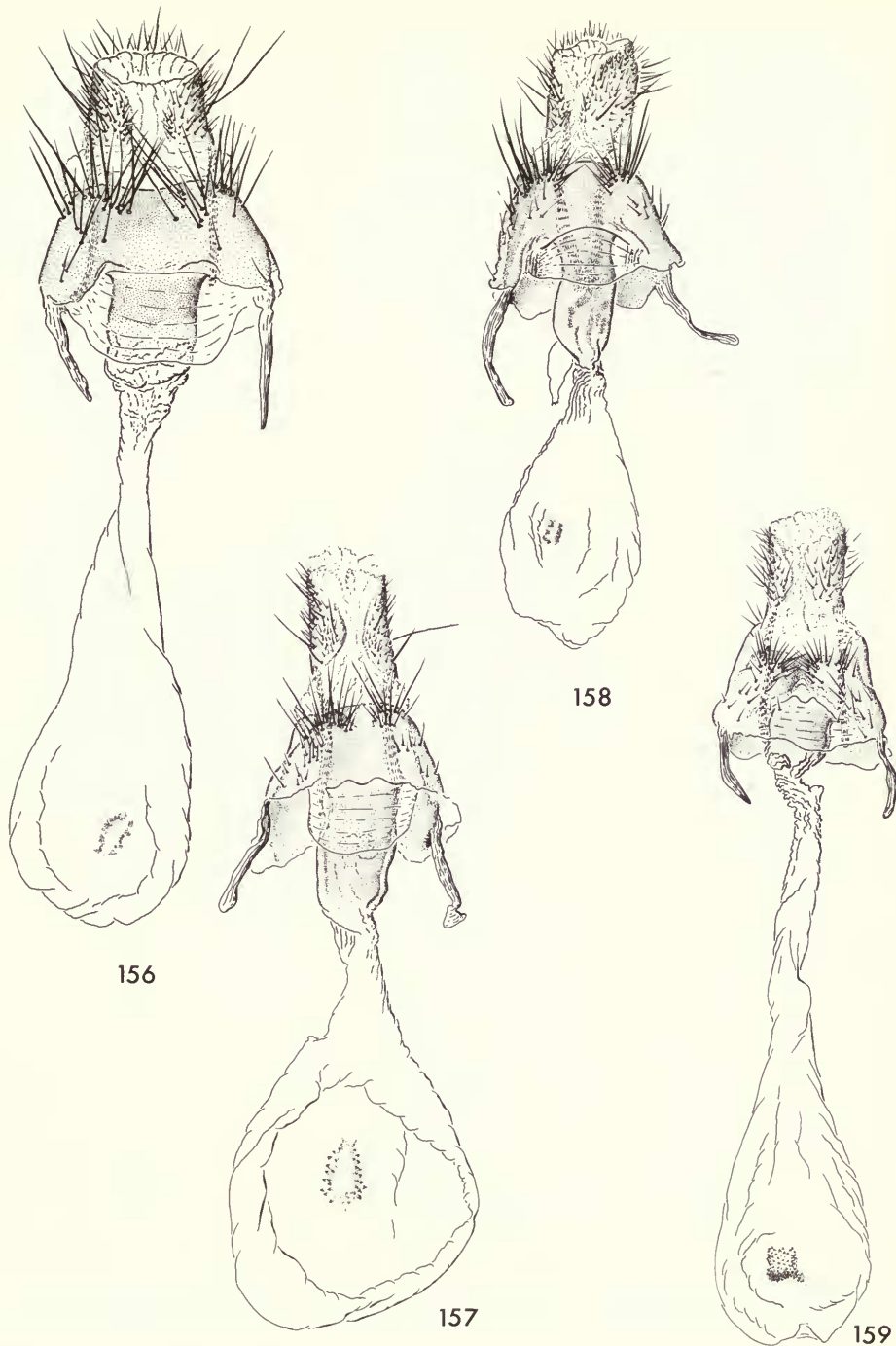
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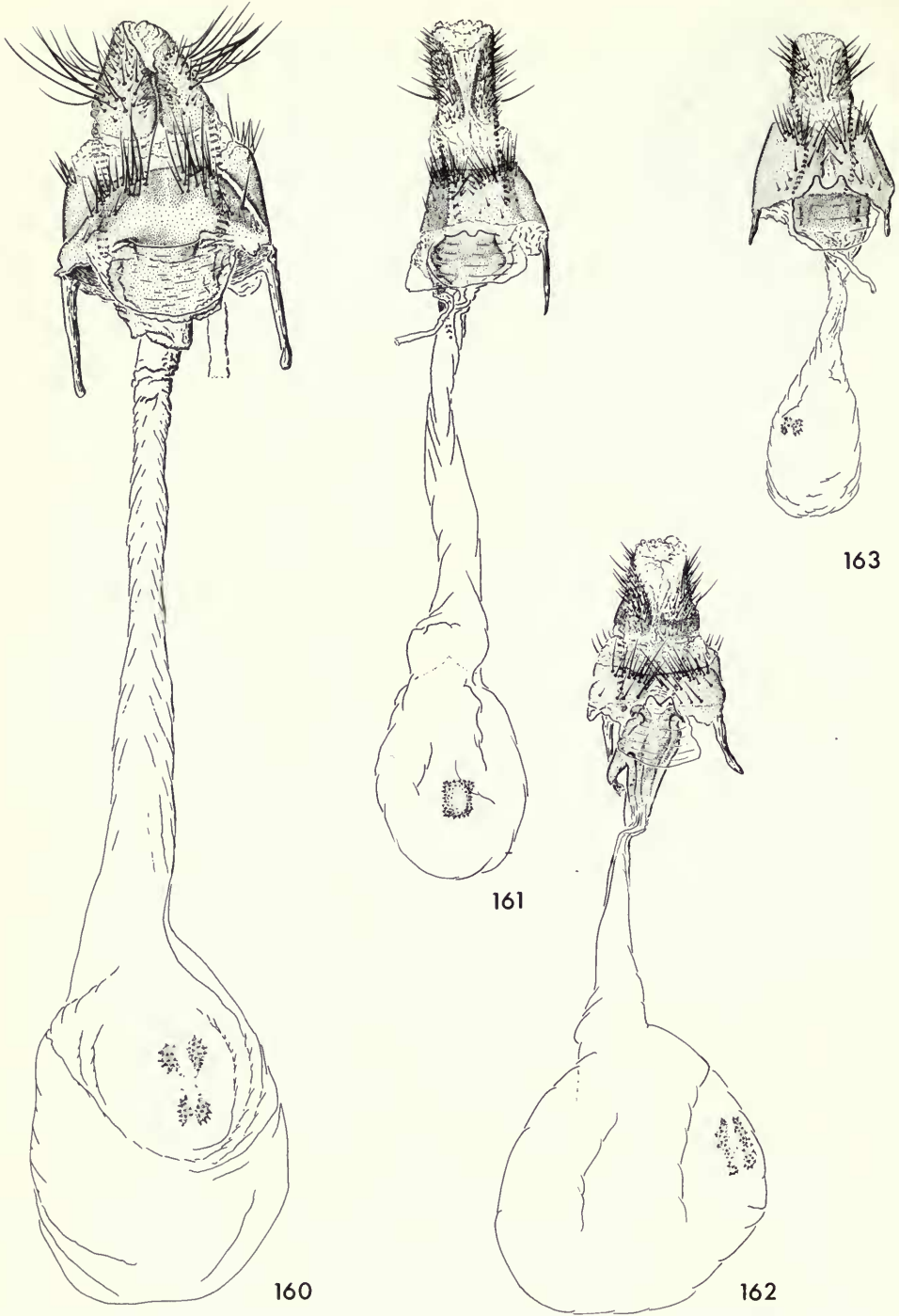
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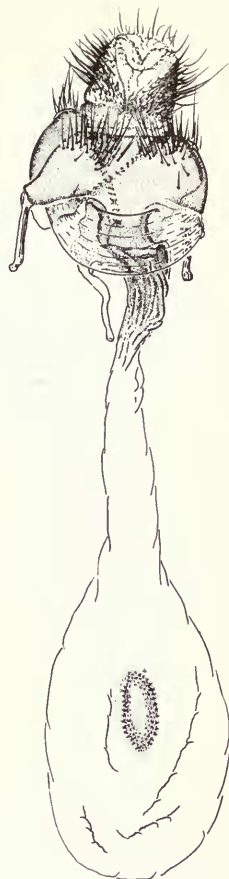
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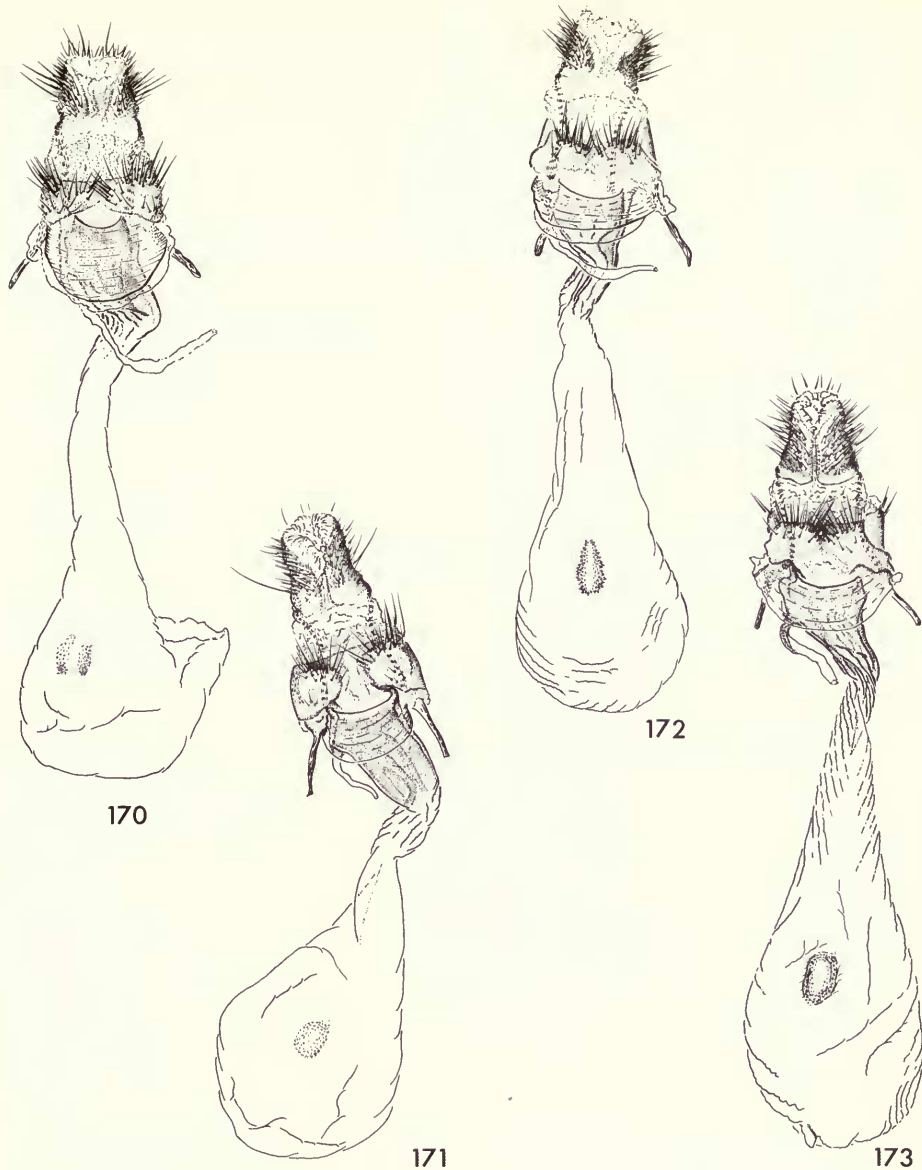


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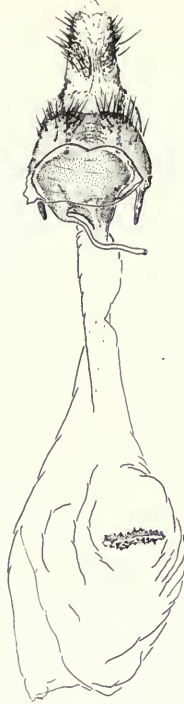
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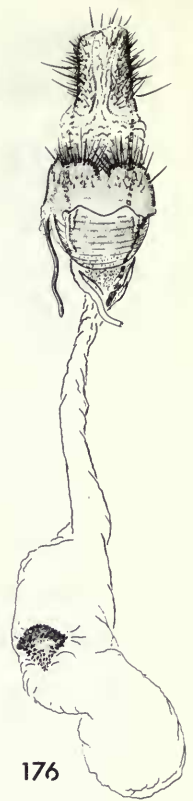
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